VR100 USER MANUAL

How to use the VR100 receiver – as a manually tracking receiver and as a transponding deckbox.

vemco

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Summary of Manual

This manual is intended to provide VEMCO users with the information they require to use the **VR100 receiver**. VEMCO highly recommends that the user fully read the manual before using the equipment or the VR100HS software.

Section 1: Introduction

Getting to know the VR100 receiver

Section 2: Getting started

Getting the VR100 setup to detect your tags and how to perform initial tests

Section 3: Software

Using VH100HS software with a VR100

Section 4: In the Field

Important tasks and points to consider when using the VR100 in the field

Section 5: Maintenance

How to care for the equipment and prepare it for storage

Section 6: Additional Information

Additional information about the VR100 that is good to know but not mandatory for basic operations

Section 7: Common Questions

Answers to frequently asked questions related to using the VR100 receiver

Section 8: Troubleshooting

Solutions to common issues that may arise

Section 9: Appendix

For the latest versions of user manuals and software, visit www.vemco.com.

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WARNING

Permanent hearing loss may occur if the headphones or internal speaker is used at high volume. Set the volume to a safe level. Avoid turning up the volume to block out noisy surroundings.

WARNING

If the VR100 is not used in the manner specified by the manufacturer, warranty protection may be impaired.

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1 Introduction

1.1 System Overview

The VR100 is a general-purpose, ultrasonic, splash-resistant receiver designed for manual tracking of aquatic animals from small boats or for recording laboratory data. Its hardware architecture has been developed to support a wide range of applications and transmitter types.

The VR100-200 receiver now has the ability to communicate through a transponding hydrophone to a transponding receiver, such as the VR2AR and the VR2Tx. This two-way communication allows information to be passed to the receiver, such as sending a release command to a VR2AR allowing it to separate from its mooring, and information to be received from the receiver, such as the number of detections stored in memory. Receivers also report the absolute distance between the receiver and the transponding hydrophone connected to the VR100. The VR2AR, with its depth sensor, can also report its depth and the horizontal distance between it and the transponding hydrophone.

All the VR100 receiver's Digital Processing and Controller Functionality is software based and can be updated in the field from a laptop. This allows new features, such as specialized tag detection algorithms and support for new tag types, to be added during the life of the product and without the product having to return to the factory.

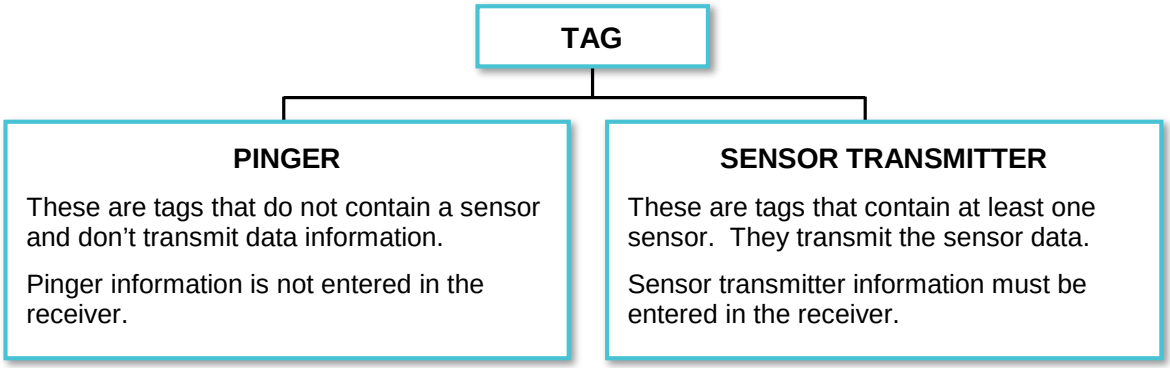
VR100 Quick Facts	
Dimensions	34 cm x 32 cm (with handle extended) x 15 cm
Weight	VR100-100: 5.2 kg VR100-200: 6.5 kg
Receive Frequency	12 to 200 kHz
Battery Life	Approximately 12 hours when operating between 10°C and 40 °C with backlight off; less with backlight on or when transponding.
AC Power Supply:	100-240V; 50/60Hz; 0.80A max (details in Specifications – section 9.3)
DC Power Supply:	10 - 15VDC; 3A max
Operating temperature	-5°C to +40 °C; Battery life is reduced below 0°C.
Software	VEMCO VR100HS software

The VR100 receiver can detect continuous and coded tags on eight separate frequencies and at the same time. It can also store the detections, along with the date/time and GPS location of the receiver at the time of the detection, to be loaded to a computer for viewing or analysis. Communication between the computer software and the VR100 receiver occurs via the supplied USB cable.

The internal gel-cell rechargeable battery can operate for approximately 12 hours under normal operating conditions with the backlight off. Operating time with the backlight on or performing acoustic communication will shorten the battery time. The VR100 receiver can also be operated while the battery is being charged from the supplied AC adapter or an external DC source, allowing the receiver to continue to operate during the charging process. However, for the best noise performance, the VR100 receiver should be disconnected from the PC and charger as these devices can sometimes add unwanted noise to the receiver.

The VR100 receiver is designed to operate with a hydrophone containing a high gain, low noise pre-amplifier powered by the receiver. An omni-directional hydrophone is useful when identifying activated tags in the area. A directional hydrophone is used to enable the VR100 receiver to locate and track a transmitter. When acoustically communicating with VEMCO's receivers, the transponding hydrophone must be used. More information about the various hydrophones is found in section 1.5.1.

This manual refers to tags, pingers, and sensor transmitters. The relationship these three terms have with each other is shown in the diagram below. A tag can be a pinger or a sensor transmitter, coded or continuous.


TAG
PINGER
These are tags that do not contain a sensor and don't transmit data information.
Pinger information is not entered in the receiver.
SENSOR TRANSMITTER
These are tags that contain at least one sensor. They transmit the sensor data.
Sensor transmitter information must be entered in the receiver.

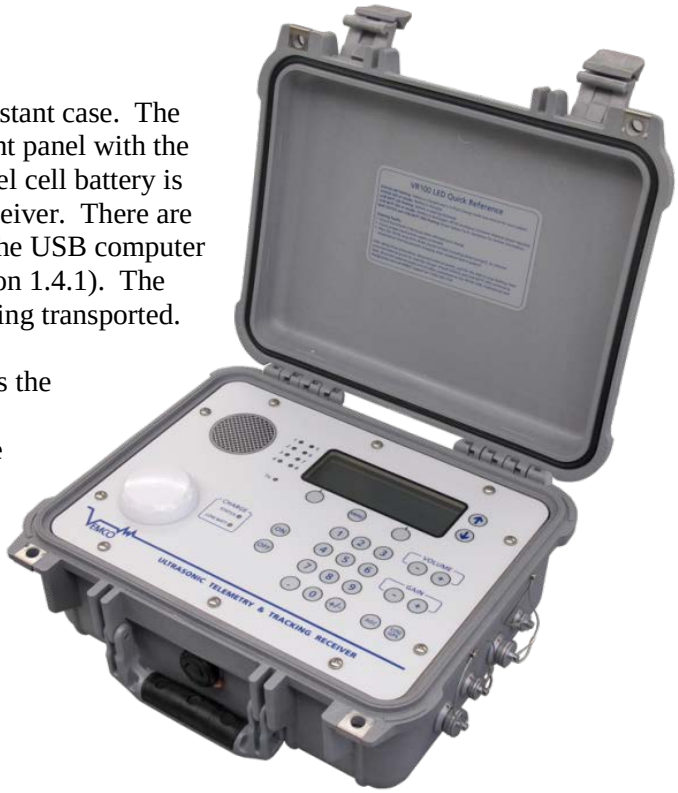
1.2 Quick Setup

The list below gives the order of actions needed to set up and use the VR100 receiver. The steps may reference sections in this manual that contain more details about that step.

1. Connect the hydrophone to the bulkhead connector on the side of the case (see section 2.1.1).
2. Power the VR100 receiver by pressing the ON button (see section 1.4.2).
3. Wait for the VR100 to boot up and display the Main screen (see section 6.1.1).
4. Select the appropriate local time offset (see section 2.1.2).
5. Set the display units to be used for sensor transmitters, if applicable (see section 2.1.3 or 3.9).
6. Enter information for sensor transmitters, if applicable (see section 2.2 or 3.8.1).
7. Configure channels for use during monitoring or tracking (see section 2.3).
8. Turn on the channels to be used (see section 2.3.5).
9. Make sure the backlight is in the desired mode (see section 2.1.5.1). Smart Mode is recommended.
10. Adjust the LCD display contrast; if necessary (see section 2.1.5.2).
11. Deploy the hydrophone. Section 1.5.1 contains key points and tips to consider when choosing the hydrophone to use and section 4.1.1 contains tips for deploying the hydrophone.
12. Monitor the deployed tags as described in section 4.2.2
13. When monitoring is complete, retrieve the hydrophone.
14. Connect the VR100 to the VR100HS software and offload the data (see section 3.4).
15. Turn the VR100 off when session is complete.
16. Disconnect the hydrophone from the VR100 case and replace the connector's protective cap.
17. Charge the battery for the next deployment (see section 5.2).

Fully charge the VR100 battery after every use and before storage. ***Ensure the battery is charged every three to four months during storage***. If not, the battery can become fully depleted and permanently damaged (section 6.3)

1.3 VR100 Case



The VR100 receiver is housed in a strong, sealed, splash-resistant case. The cover of the case must be opened to access the receiver's front panel with the LCD display and the soft-touch controls (section 1.4.2). A gel cell battery is housed inside the case to supply stand-alone power to the receiver. There are connectors on the right side of the case for the hydrophone, the USB computer connection, the battery charger, and audio headphones (section 1.4.1). The case should always be latched closed while the receiver is being transported.

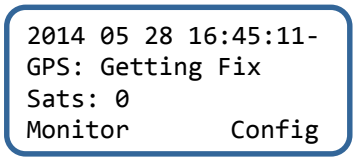
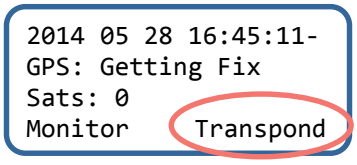
The VR100 receiver can be used during a light rain as long as the hydrophone is connected to the case and the remaining three protective caps are in place. Water should be wiped from the front panel with a dry cloth before it accumulates. The USB cable, battery charger, and headphones should only be used when the receiver is safe from exposure to water.

> Only use the USB cable, battery charger, and headphones when the receiver is safe from exposure to water.

1.3.1 VR100 Hardware Versions

There are two major versions of the VR100 hardware covered by this manual, VR100-100 and VR100-200. You can identify the hardware version of your VR100 by observing the nameplate label, as shown in the pictures included in the table below.

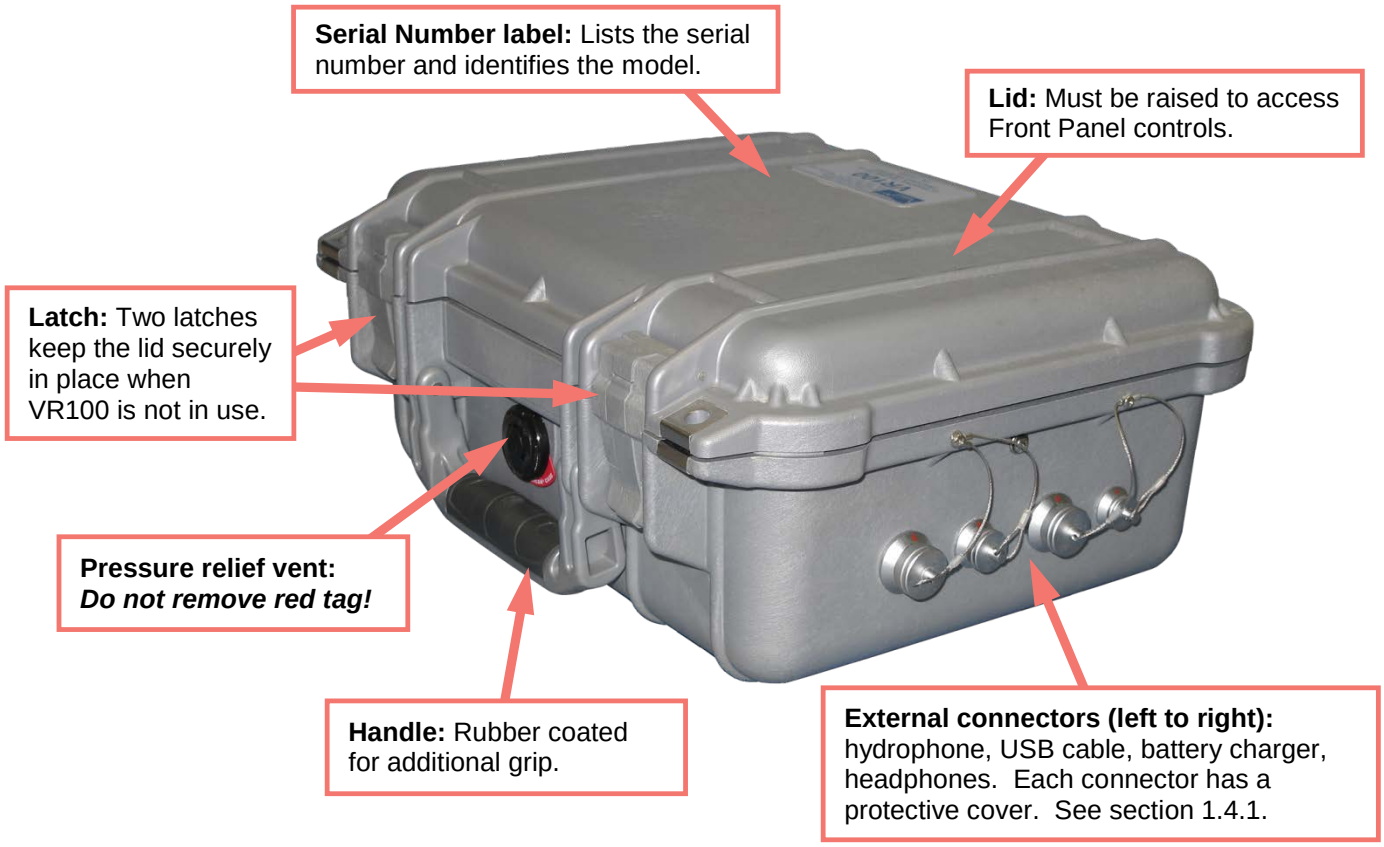
Both models provide the same basic acoustic receiver functionality, but the VR100-200 has transponding capabilities (when used with a transponding hydrophone) and has a new GPS and antenna with improved performance specifications and support for WAAS, EGNOS and MSAS augmentation for enhanced accuracy.

Visible Differences	**VR100-100**	**VR100-200**
Serial Number Label		
Main Screen		

1.4 Case Parts

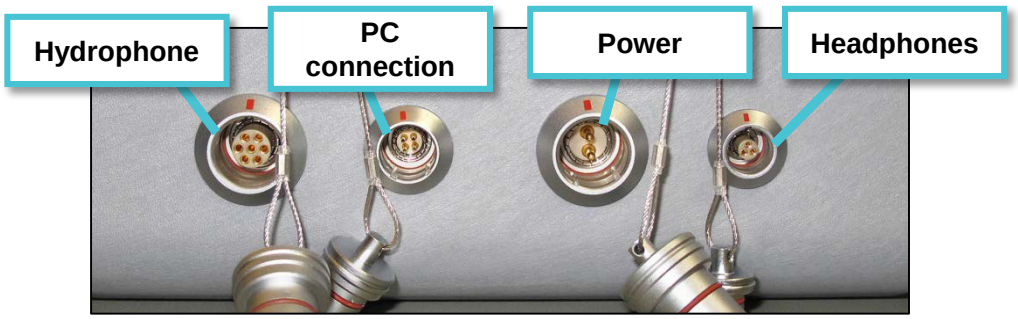
The external components of a VR100 consist of a hydrophone, a USB cable, a battery charger, and headphones. These components are all connected to the VR100 through connectors on the side of the case.

The case has a pressure relief vent to allow any pressure build-up in the case to release before the case is opened. A manufacture's tag is attached to the vent and should not be removed. Removing the tag may damage the vent.


Serial Number label: Lists the serial number and identifies the model.
Lid: Must be raised to access Front Panel controls.
Latch: Two latches keep the lid securely in place when VR100 is not in use.
Pressure relief vent: ***Do not remove red tag!***
Handle: Rubber coated for additional grip.
External connectors (left to right): hydrophone, USB cable, battery charger, headphones. Each connector has a protective cover. See section 1.4.1.

1.4.1 Connectors and Caps

There are four bulkhead connectors on the right side of the VR100 case that are used to connect the different components of the VR100 system to the receiver, such as the hydrophone. The picture below shows the connectors without their protective caps in place.



Each bulkhead connector has a cap to protect the connector from contact with water. When the protective cap from the receiver's hydrophone connector is removed, it should be joined to the protective cap attached to the hydrophone cable, as shown in the photo at right. Otherwise, the caps should always be protecting the connectors from moisture.

Join protective caps when they're not in use.

The connector's protective cap is used to prevent water from entering the connector and damaging the connector and possibly the receiver. With the cap properly in place, the VR100 is extremely splash-resistant.

Connector halves properly lined up.

The red dot on the end of the connector must line up with the red line on the VR100's connector, as shown in the photo on the right. The connectors have unique grooves to prevent the wrong connector halves from being placed together.

The connector's protective cap is used to prevent water from entering the connector and damaging the connector and possibly the receiver. With the cap properly in place, the VR100 is extremely splash-resistant.

To properly install a connector protective cap:

1. Select the proper cap. The caps are in two sizes, small and large. The small caps are for the PC communication connector and the headphone connector. The large caps are for the hydrophones and the battery charger.
2. Check that the O-ring on the cap (identified below) is clean and undamaged.
3. Insert the cap into the connector on the side of the VR100 case.
4. Press the cap into the connector until the lip of the cap is in contact with the connector ring on the VR100 case.

*Connector protective cap – **not** properly inserted in connector.*

Connector protective cap – properly inserted in connector.

The **protective caps must be in place** on the receiver when a cable isn't connected to the bulkhead connectors. Water that comes in contact with exposed bulkhead connectors can damage the receiver.

1.4.2 VR100 Front Panel

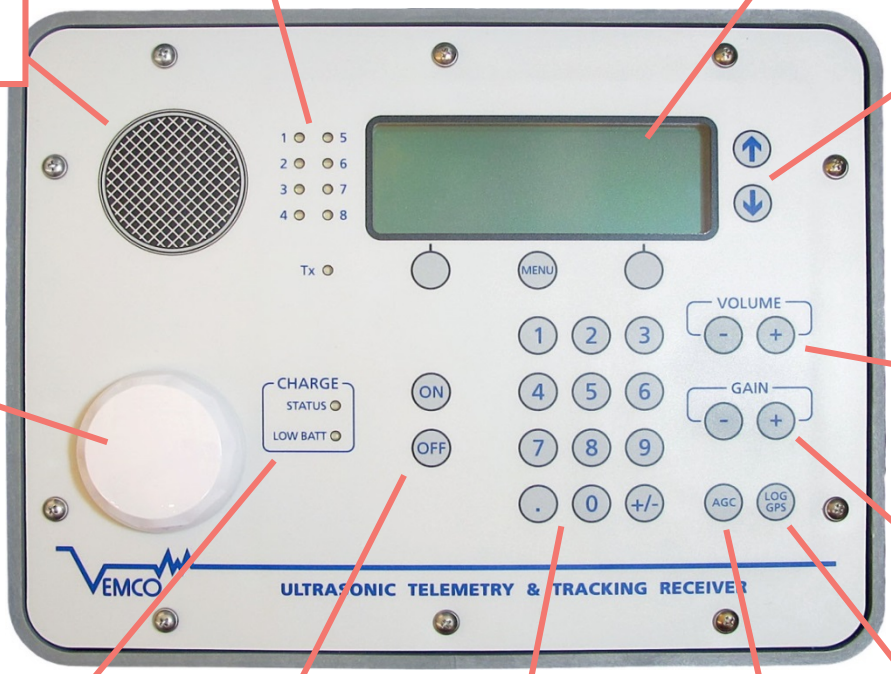
The VR100 receiver's front panel allows the VR100 to be configured, allows deployed tags to be monitored, and allows two-way acoustic communication with transponding receivers like the VR2AR – including sending the release command. The panel uses soft press keys for all its data entry and controls, increasing the receiver's ability to operate in a moist environment. The soft buttons are easy to wipe clean but still give the user a "click" that can be both heard and felt to verify the button has been pressed. The different aspects of the VR100 front panel are identified in the photo below with brief explanations in the following sections.

Audio speaker: broadcasts received pings when in Monitor mode (section 4.2).

Detection indicators: these green lights flash each time a ping is detected or transmitted. The red "Tx" light is also on during transmitted pings. Each light corresponds to a receiver channel.

LCD screen and related buttons: LCD screen is used to monitor tags and to configure the VR100 (section 1.4.3)

Up/Down buttons: move the cursor through a displayed list.



Volume control: increase or decrease the volume of the audio signal heard from either the speaker or the headphones. The buttons can be held down or pressed repeatedly for a larger change in volume.

GPS antenna: contained inside the plastic "puck" for protection, it receives GPS signals when the VR100 is outdoors, even with the case lid closed.

Gain Controls: increase or decrease the gain level in steps of 6 dB (section 4.2.3).

Battery charge indicators: these show the status of the battery charging process and indicate when the battery charge is low (section 5.2).

Power buttons: turn the VR100 on or off.

Numeric keypad: used to enter numbers when needed.

AGC button: "Automatic Gain Control" button toggles between automatic and manual gain (section 4.2.3).

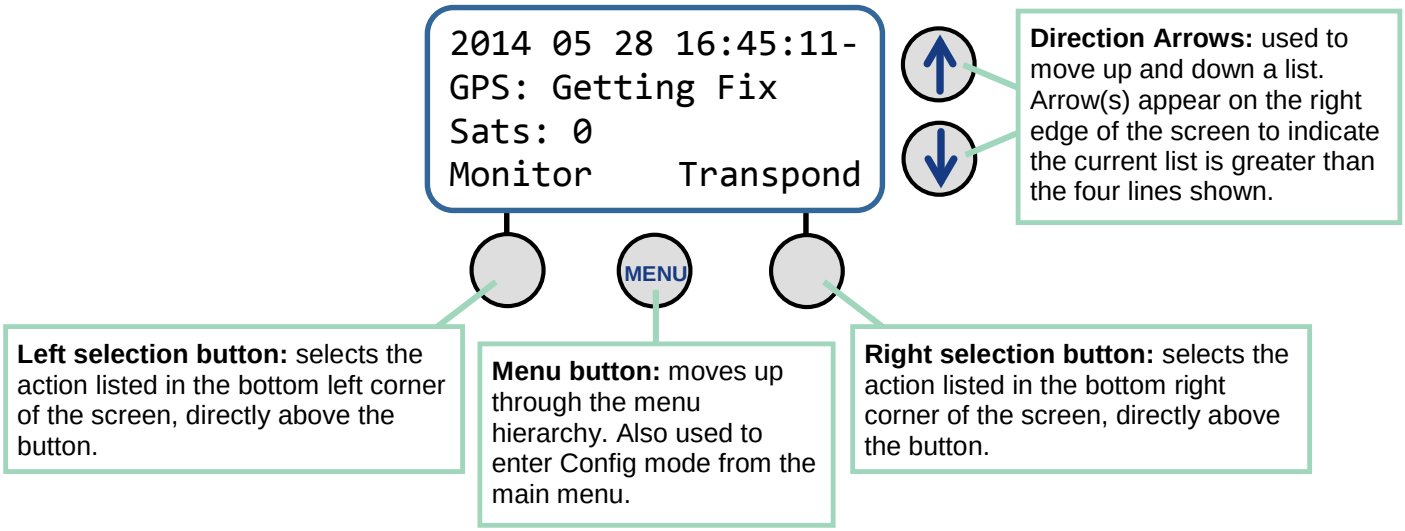
LOG GPS button: press button and the next valid GPS position is recorded to the VR100's memory (section 7.2.5)

WARNING

Never remove the VR100's front panel. There are ***no user-serviceable parts*** inside. Removing the front panel will void your warranty.

1.4.3 VR100 Screen

The LCD screen on the VR100 receiver has four lines for text and changes based on the task at hand. The Main Screen is shown below and appears when the VR100 is turned on. The buttons used with the screen are identified and described in the sketch below. These buttons are used throughout the menu architecture. While the Main Screen is visible, the left selection button begins the monitoring process explained in section 4.2. The MENU button opens the Configure menu where the ability to configure the VR100 is available, as explained in section 6.1.2. The Transponding menu, found in the VR100-200, is entered with the right selection button ("Transpond").


2014 05 28 16:45:11-
GPS: Getting Fix
Sats: 0
Monitor Transpond
MENU
Direction Arrows: used to move up and down a list. Arrow(s) appear on the right edge of the screen to indicate the current list is greater than the four lines shown.
Left selection button: selects the action listed in the bottom left corner of the screen, directly above the button.
Menu button: moves up through the menu hierarchy. Also used to enter Config mode from the main menu.
Right selection button: selects the action listed in the bottom right corner of the screen, directly above the button.

The Direction Arrows are used to scroll through a display that contains more than four lines or a list of options. Look for an arrow in the right side of the screen to know if the Direction Arrows should be used. ↑ ↓

1.5 Attachments

1.5.1 Hydrophones

The hydrophone can be compared to a human ear where the VR100 is the human brain. Our ear hears the noises around us and transfers the signals to the brain where they are analyzed and identified. The hydrophone hears pings from acoustic tags in the water, as well as other noises in the environment such as current flow, marine animals, and ship engines. It transfers all these noises to the VR100 receiver which uses electronic filters to separate the pings from other noises. The pings are then identified and recorded. The VR100 can't function without a hydrophone.

The VR100 can't function without a hydrophone.

Omni-directional hydrophones can receive signals from any direction, making them excellent for listening for any tags in an area. The directional hydrophones are designed so pings are heard in only one direction allowing them to be used to determine the direction from which a ping originated.

The transponding hydrophone (VHTx) is an omni-directional hydrophone with the ability to transmit as well as receive, or to talk as well as listen. It is visually different from the "receive only" omni-directional hydrophones with a larger case and a protective cage around the more delicate end of the hydrophone. This

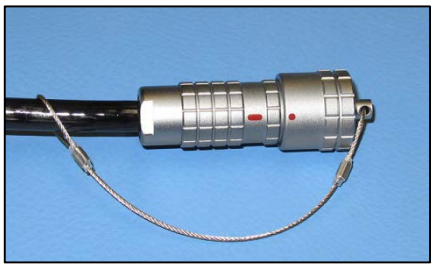
hydrophone is also weighted for easier deployments. When a transponding hydrophone is attached to a VR100-200, acoustic communication to a transponding receiver is possible.

All hydrophones listed in the table below will function with either VR100 model, although the transponding capabilities of the VHTx hydrophone will only function with a VR100-200 running firmware version 3.3.1 or later. The hydrophone you choose to use will depend on your needs.

Hydrophone	Recommended Usage
VH165 - Omni-directional - 50-85 kHz - Black epoxy housing	Monitoring and testing 69 kHz coded and 50 – 85 kHz continuous transmitters.
VH110 - Directional - 50-85 kHz - Hydrodynamic black anodized aluminum case	Locating and tracking 69 kHz coded and 50 – 85 kHz continuous transmitters.
VH180 - Omni-directional - 180 kHz - Green epoxy housing	Monitoring and testing 180 kHz coded transmitters.
VH180-D - Directional - 180 kHz - Hydrodynamic black anodized aluminum case	Locating and tracking 180kHz coded transmitters.
VHTx-69kHz - Transponding - Omni-directional - 50-85 kHz - Black acetal case with stainless-steel cage	Monitoring and testing 69 kHz coded and 50 – 85 kHz continuous transmitters. Communicating with a receiver to learn receiver stats or to send a release command (VR2AR only)

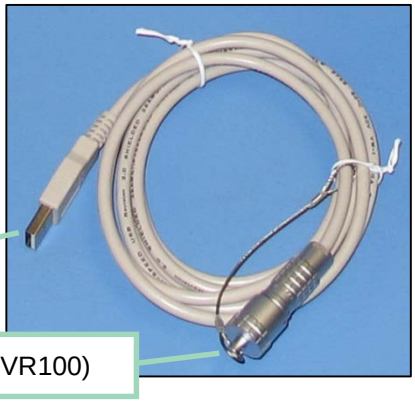
Regardless of the hydrophone being used, it is connected to the VR100 through the bulkhead connector on the side of the receiver (see section 1.4.1).

The protective cap attached to the hydrophone cable should always be on the cable's connector when the hydrophone is not connected to the VR100 to prevent water from entering the hydrophone's connector. Water in the connector may enter the cabling and cause damage.



1.5.2 USB Cable

The VR100 receiver is connected to a computer through an adapted USB cable, shown at right. The marine grade connector is connected to the second connector from the left on the VR100 case (see section 1.4.1) and the USB connector is connected to a USB port on the computer.



Please read the USB warning at the front of the manual.

WARNING

Do not allow cable connectors to come in contact with water. Water could enter the back of the connector and damage the cable, which could potentially damage the VR100 receiver.

1.5.3 Headphones

A marine grade headphone jack is located on the side of the VR100 case (see section 1.4.1). A pair of headphones with a matching jack can be purchased from VEMCO.

WARNING

Permanent **hearing loss** may occur if the headphones or internal speaker is used at high volume. Set the volume to a safe level. Avoid turning up the volume to block out noisy surroundings.

2 Getting Started

The basic information you need to get started using the VR100 is contained in this section of the manual. Additional information, including more advanced tasks, is contained in a later section.

2.1 Setup VR100

There are some basic things that should be done before the VR100 is used, such as setting the time offset, selecting units used for sensor tags, verifying the code map you require, and entering sensor tag information. Additional tasks are explained in the "Additional Information" section of this manual (section 6).

2.1.1 Attach hydrophone

The hydrophone being connected to the VR100 depends on the task and operating frequency of the tags being used. For example, to determine if a 69kHz tag is in the area, the VH-165 is usually selected. The hydrophone types and tasks are identified on section 1.5.1.

STEP 1

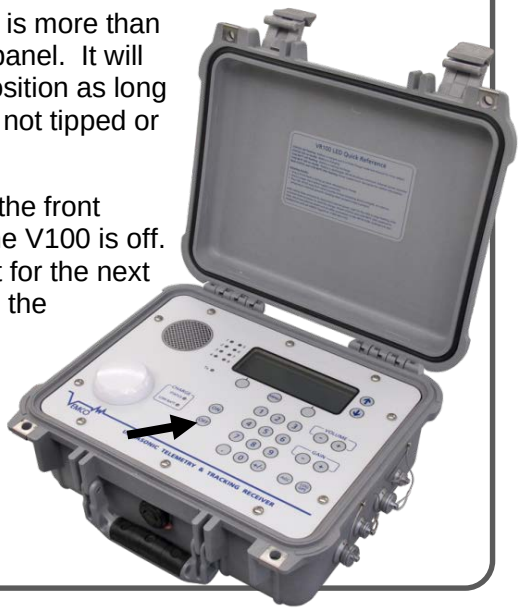
Place the VR100 on a flat, stable, horizontal surface so the serial number label is facing up.

Lift one or both latches upward until they are horizontal. The latches will separate slightly for easier opening.

STEP 2

Lift the lid until it is more than 90° to the front panel. It will remain in this position as long as the VR100 is not tipped or jarred.

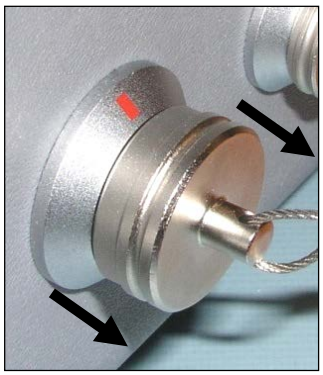
Press "OFF" on the front panel to verify the V100 is off. This is important for the next step, connecting the hydrophone.



Continued…

STEP 3

Remove the protective cap from the hydrophone connector by grasping the ridged edge of the cap and pulling away from the VR100.



Remove the protective cap from the connector on the end of the hydrophone you're using.

WARNING

Never remove the receiver's front panel from the case – the internal components could be irrevocably damaged. ***There are no user-serviceable parts inside. Opening the unit will void your warranty.***

STEP 4

Line up the red dot on the hydrophone connector with the red line on the ring around the VR100's hydrophone connector and push the two together until you hear a "click".

Only connect the hydrophone when the VR100 is ***not powered*** (off).

STEP 5

Connect the two protective caps together (see picture at far right) to keep moisture from gathering inside the caps. If there is any moisture inside the cap when the cap is returned to the connector, the connector could be damaged and may damage the VR100 as a result.

The red dot on the end of the connector must line up with the red line on the VR100's connector, as shown in the photo on the right. The connectors have unique grooves to prevent the wrong connector halves from being placed together.

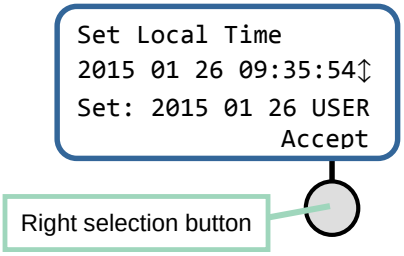
WARNING

DO NOT get water in the connectors on the cables that attach to the VR100 receiver, such as the PC connection cable or the headphone cable. Water will enter the connector to damage the cabling and potentially damage the receiver.

2.1.2 Set Local Time Offset

The UTC offset and the local date and time are set by following the steps below from the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press “2” on the keypad.
3. Press “1” on the keypad.
4. Enter the UTC offset for the area where the VR100 will be used (see section 6.7) on the keypad. This is a number between –12.0 and +12.0. The negative, if needed, must be entered before the number or the number will be erased and have to be re-entered.
   NOTE: One decimal place is available for time zones that have an offset of more than a multiple of an hour. For example, Newfoundland Standard Time (NST) is 3.5 hours behind UTC so the offset value “–3.5” would be entered.
5. Press the right selection button to accept the offset value. The screen shown below will appear for the date and time to be set.
6. Use the up and down arrow buttons to move the cursor horizontally to the desired component of the date/time.
7. Enter the new numbers on the keypad.
8. Repeat steps 6 and 7 until the date and time are entered as desired.
9. Press the right selection button to accept the changes.



The Set Local Time screen also displays the date the time was last set and by whom, either the user (USER), the GPS (GPS), or the PC software (USB). If the display reads DFLT, then either the time has never been set or the time was lost if the battery was fully drained of power and recharged. The time is maintained as long as the battery is charged.

2.1.3 Select Units (sensor tags only)

The temperature and depth units are selected on a global level. This means that all temperatures values on all screens will have the temperature units selected in the Units sub-menu, and all depth values on all screens will have the depth units selected in the Units sub-menu. Follow the steps below to select the units.

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press “2” on the keypad.
3. Press “5” on the keypad.
4. Press “1” for temperature units or “2” for depth units.
5. Use the arrow buttons to move through the list of unit options (see table at right) until the desired unit is seen on the screen, with the flashing cursor.
6. Press “Select” (right selection button).

Sensor Units Available	
Temperature	Degrees Centigrade (°C) Degrees Fahrenheit (°F)
Depth	Meters (m) Feet (ft) Pounds per square inch (PSI)
Acceleration	Meters per second per second (m/s^2) Feet per second per second (ft/s^2) G (units gravitational force)

2.1.4 Verify Code Maps

There are three default code maps used with VEMCO coded tags, MAP-113 for 69 kHz, MAP-413 for 180 kHz and MAP-311 for 81 kHz. These maps are installed by default but it is wise to verify that these default maps are the ones on which your tags operate.

To view the Code Spaces supported by each map, follow the steps listed below. From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press "3" on the keypad.
3. Select the desired code map number on the keypad.
4. Select "View" by pressing the right selection button.
5. Use the arrow buttons to cycle through the Code Spaces supported by the Code Map.

2.1.5 Select Backlight and Contrast Setting

2.1.5.1 Backlight

There are three options available for backlight operations, ON, OFF, and SMART. The ON option turns the backlight on and it remains on until it is turned off using the OFF option. The backlight should only be needed indoors and at night. Operating the VR100 with the backlight on will greatly reduce the operating time between battery charges. The SMART option leaves the backlight off if the keypad is inactive but will turn the backlight on for five seconds when a button is pressed on the keypad.

To change the backlight setting, from the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press "2" on the keypad.
3. Press "3" on the keypad. The current backlight setting is displayed with an arrow symbol.
4. Press the up or down arrow button until the desired option is shown on the display.
5. Press the button attached to "Accept" to accept the change, or "Cancel" to exit the menu without changing the backlight setting.

2.1.5.2 Contrast

The contrast between the text and the background on the VR100's screen can be adjusted. The contrast should be set so the text on the screen is clearly visible without any of the background lines being visible.

To adjust the contrast, follow the steps below. From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press "2" on the keypad.
3. Press "2" on the keypad.
4. Use the left selection button to decrease the contrast (Less) or the right selection button to increase the contrast (More) to the desired level.
5. Press the MENU button to accept the changes.

2.2 Enter Tag Information

Tags without sensors do not need to be setup in the VR100.

Information must be entered for sensor transmitters for the data to be displayed in the correct units. Data received from coded sensor transmitters can be displayed without this information stored in the receiver, but it will be raw data and need to be converted manually. The necessary information is entered by following the steps below.

The Sensor transmitters menu, a sub-menu of the Configure menu, contains three sub-menus. Each sub-menu allows sensor transmitters to be set up in the receiver so the data will be displayed in the correct units. Hundreds of sensor transmitters may be set up in the receiver at one time. The sub-menus are (in order): Coded, Cont One, and Cont Two.

When the VR100 tag storage capabilities are full, a new tag can't be entered until an existing tag is deleted. To delete a tag, first highlight the tag by either scrolling through the list of entered serial numbers or by entering the serial number on the keypad. When the desired tag is highlighted, select "Delete" in the bottom left corner of the screen (press the left selection button). A confirmation screen will appear to verify that you want to delete the tag. Note that the delete function is only available when the sensor database is full.

Setting up sensor tags can also be performed in the VR100HS software.

This can also be performed within the VR100HS software (see section 3.8.1).

The tag's information that must be entered in the VR100 is found in the Transmitter Specification manual shipped with the tags. The information entered differs slightly for continuous and coded tags.

2.2.1 Setup a Coded Sensor Tag

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press "4" on the keypad. This displays the list of sensor tag types.
3. Select "1" to select "Coded sensor tag" from the list:
4. If a list of serial numbers appears, press the left selection button to select "New".
5. Enter the serial number of the tag and press "Next".
6. Enter the tag's operating frequency.
7. Select the code space from the list provided by pressing the up or down arrow until the correct code space name is shown on the display.
8. Enter the coded tag ID number.
9. Enter the tag's slope value.
10. Enter the tag's intercept value.
11. Enter the data type (temperature, depth, or acceleration).
12. Press the right selection button to "Accept" this tag. If more tags are to be entered, repeat steps 3 to 12.
13. Press the Menu button until the Main screen appears.

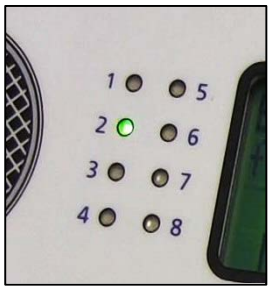
NOTE: For coded two-sensor tags, two separate sensor tag entries are required – one for each tag ID (sensor). Since the VR100 does not allow duplicate serial numbers in the sensor database, the serial number for the second sensor entry must be different than the first sensor entry. We recommend that you use the serial number provided on the specification sheet for the first sensor entry, and the same serial number with a prefix for the second sensor entry. For example, use "20" as the prefix:
Sensor 1 SN: 1034857 Sensor 2 SN: 201034857

2.2.2 Setup a Continuous Sensor Tag

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press “4” on the keypad. This displays the list of sensor tag types.
3. Select either “2 One-sensor continuous tag” or “3 Two-sensor continuous tag” depending on the tag type.
4. If a list of serial numbers appears, press the left selection button to select “New”.
5. Enter the serial number of the tag and press “Next”.
6. Enter the tag’s operating frequency.
7. Enter the tag’s sync value if this is a two-sensor tag (default = 1150 ms).
8. Enter the tag’s slope value.
9. Enter the tag’s intercept value.
10. Enter the data type (e.g. temperature, pressure). If this is a two-sensor tag, this information is entered for the second sensor.
11. Enter the Minimum Period value.
12. Enter the Maximum Period value.
13. Press the right selection button to “Accept” this tag. If more tags are to be entered, repeat steps 3 to 13.
14. Press the Menu button until the Main screen appears.

2.3 Setup Channels



A channel in the VR100 is a group of configuration settings used to listen to VEMCO tags. For example, a channel can be configured to listen for continuous pingers that operate at 60 kHz. Another channel can be configured to listen for coded tags operating at 69 kHz. Up to eight channels can be monitored simultaneously, although only one channel can be viewed at a time on the screen. A green light will flash to the left of the screen when a ping is detected on the corresponding channel. For example, if channel 2 was setup to detect 60kHz continuous tags, then the “2” light would flash green when a 60kHz ping was detected.

NOTE: If a channel is configured for transponding then it is not available for conventional monitoring.

2.3.1 Setup a Channel to Monitor a Continuous Pinger (no sensor)

A channel can be set up to monitor continuous pingers operating on the same frequency. All pingers operating on that frequency will be detected, so normally an experiment uses a single continuous pinger per frequency. Continuous pingers on other frequencies can be monitored on other channels.

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press “1” on the keypad.
3. Select the desired channel number on the keypad, or use the arrow buttons to move through the list of channels until the cursor is over the desired channel.
4. Press the right selection button to select “Configure”. The current channel configuration is displayed in a summary screen.

5. Press the left selection button to “Edit” this channel, or press the right button to “Accept” the channel configuration.
6. Use the arrow buttons to select “Cont pinger” and press the right selection button for “Next”.
7. Enter the desired frequency in kilohertz and select “Next”.
8. Enter the desired Blanking Interval and select “Next”. If the chosen blanking interval is outside the recommended range, a confirmation screen appears to verify the blanking interval is the desired value.
9. Review the information on the screen.
10. Press the right selection button to “Accept” the configuration, or press the left selection button to repeat the configuration process.
11. Verify that the cursor is over the channel you just set up. If it isn’t, use the up/down arrows until the cursor is in position or press the corresponding number on the keypad.
12. Press the left selection button for “Set on” to turn this channel on. If you don’t want to turn the channel on at this time, perform steps 11 and 12 at a future time, or see section 2.3.5.

2.3.2 Setup a Channel to Monitor a Continuous Sensor Tag

A channel can be set up to monitor one continuous sensor transmitter. Other continuous sensor transmitters are monitored on other channels.

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press “1” on the keypad.
3. Select the desired channel number on the keypad, or use the arrow buttons to move through the list of channels until the cursor is over the desired channel.
4. Press the right selection button for “Configure”. The current channel configuration is displayed in a summary screen.
5. Use the arrow buttons to select the type of continuous sensor transmitter to be monitored, either “Cont 1 Sensor” or “Cont 2 Sensor”.
6. Press the right selection button for “Next”.
7. Enter the serial number of the desired tag, or use the arrows to select it from the list, and select “Next”. NOTE: The tag must be set up in the receiver before it can be monitored. See section 2.2.2 or 3.8.1 for how to set up a continuous sensor transmitter in the VR100 receiver.
8. Review the summary screen to verify that the information is correct.
9. Press the right selection button for “Accept”.
10. Select the channel to be set up by either using the up/down arrows or pressing the corresponding number on the keypad.
11. Press the left selection button for “Set on” to turn this channel on. If you don’t want to turn the channel on at this time, perform steps 10 and 11 at a future time, or see section 2.3.5.

2.3.3 Setup a Channel to Monitor a Coded Tag

A channel can be set up to monitor a large number of coded tags on one frequency.

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press “1” on the keypad.
3. Select the desired channel number on the keypad, or use the arrow buttons to move through the list of channels until the cursor is over the desired channel.
4. Press the right selection button for “Configure”. The channel’s configuration is displayed in a summary screen.
5. Select “Edit” with the left selection button to change the channel’s configuration or “Accept” with the right selection button to return to the channel screen.
6. Use the up and down arrows to cycle through the four tag types until “Coded” is displayed and then select “Next”.
7. Enter the frequency (usually 69 or 180 kHz) on the key pad and select “Next”. NOTE: If you make an error, keep pressing the first number until the cursor returns to the first digit place.
8. Select the code map (see section 7.1.1) to be used on this channel by pressing the arrow buttons to scroll through the list of code maps.
9. Press the right selection button to select “Next”.
10. Review the summary screen to verify that the information is correct.
11. Press the right selection button for “Accept”.
12. Select the channel to be set up by either using the up/down arrows or pressing the corresponding number on the keypad.
13. Press the left selection button for “Set on” to turn this channel on. If you don’t want to turn the channel on at this time, perform steps 12 and 13 at a future time, or see section 2.3.5.

2.3.4 Setup a Channel for Transponding

The transponding process uses Channel 8 to receive communication from the receiver. VR100 receivers shipped after March 2015 have Channel 8 setup for transponding by default, but if your receiver is slightly older or the channel setup have been altered, then follow the steps listed below to setup the channel correctly.

From the Main screen:

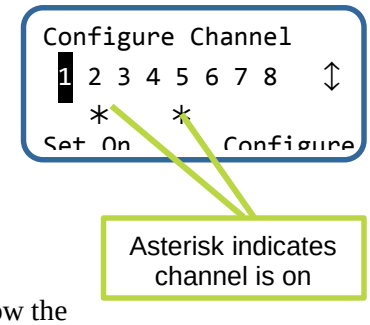
A warning will appear when transponding is selected and Channel 8 is not configured properly.

1. Select Config (see section 6.1.2.1).
2. Press “1” on the keypad.
3. Press “8” on the keypad, or use the arrow buttons to move through the list of channels until the cursor is over the “8”.
4. Press the right selection button for “Configure”. The channel’s current configuration is displayed in a summary screen.
5. Select “Edit” with the left selection button to change the channel’s configuration or “Accept” with the right selection button to return to the channel screen.
6. Use the up and down arrows to cycle through the four tag types until “Transponding” is displayed and then select “Next”.
7. Review the summary screen to verify that the information is correct.

8. Press the right selection button for “Accept”.
9. Select the channel to be set up by either using the up/down arrows or pressing the corresponding number on the keypad.
10. Press the left selection button for “Set on” to turn this channel on. If you don’t want to turn the channel on at this time, perform steps 12 and 13 at a future time, or see section 2.3.5.

2.3.5 Turn a Channel ON

A channel must be turned on before it can be monitored (monitoring is explained in section 4.2). To turn a channel on from the Main screen:



1. Select Config (see section 6.1.2.1).
2. Press “1” on the keypad.
3. Select the desired channel number on the keypad, or use the arrow buttons to move the cursor to the desired channel (the curser is on the “1” in the sample screen shown).
4. Select “Set On” by pressing the left selection button. An asterisk (∗) below the channel number indicates that channel is on. In the screen shown at right, channels 2 and 5 are on.

A channel that is currently on is turned off by pressing the left selection button when the channel is highlighted.

2.4 Testing

Before deploying tags, it is wise to test them with the VR100 to verify the tags are operating properly and the VR100 is setup to detect them.

Perform air tests away from electrical noise sources such as motors, PC screens, or fluorescent lights.

1. Turn on the VR100.
2. Select “Monitor” (left activation button).
3. Press the number of the keypad that correlates to the channel setup to hear this tag (see section 2.3).
4. Activate the tag as explained in the information shipped with the tag.
5. Place the tag near the VR100 hydrophone. For 69kHz tags, place the tag approximately 150 mm (6”) from the end of the hydrophone as shown. A tag operating at 180kHz should only be 50 mm (2”) from the hydrophone.
6. Watch the Detection Indicator lights to see the selected channel light flash. If the sound is enabled on the VR100, listen for the tag’s pings.
7. Verify that the screen shows the tag has been correctly identified.

3 Software

The VR100 can communicate with the VR100HS software to allow sensor tag information to be setup and to offload data from the receiver. The main functions performed with this software are explained in this section of the manual.

3.1 Install VR100HS software

The VR100 PC Software requires:

- A PC running Windows Vista/7/8
- At least one available USB port.

Before installing the VR100 PC Software ensure that all VR100 Receivers are disconnected from the PC.

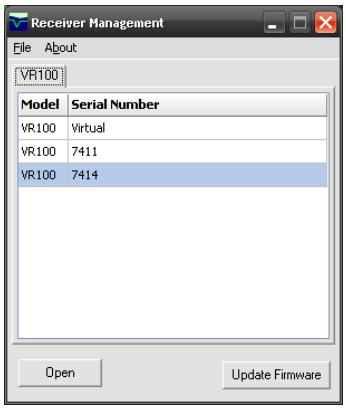
Run the VR100 PC Software setup file from the supplied CD or download it from the VEMCO website: http://www.vemco.com/support/vr100_support.php. Follow the instructions in the installation wizard.

After the software is installed connect a VR100 receiver to the PC using the supplied USB cable and turn the receiver on. Windows will automatically detect the receiver and prompt you to setup the device. Follow the on-screen instructions. When prompted, choose to install the software automatically. Windows will repeat this process each time a VR100 is connected to a different USB port.

3.2 Connect to VR100

Establishing communication between a PC and the VR100 requires the following steps:

1. Connect the large marine grade connector on the supplied VR100 USB cable to the second connector from the left on the side of the VR100 receiver. The other end of the connector must be connected to a USB port on the computer you wish to use.
2. Open the VR100HS software.
3. Turn the VR100 on.
4. Wait for the VR100's serial number to appear in the *Receiver Management* window.
5. Click the "Open" button in the bottom left corner of the window to open the VR100 Receiver window.



VR100 receivers that are currently on and connected to the VR100 software through a USB port are listed in the Receiver Control and Management Interface window, shown below. More than one receiver can be connected to the software through the computer's USB connection at the same time. A USB hub increases the number of connections available for receivers. The receiver that was most recently connected to the software is highlighted in blue in the VR100 list.

The VR100 software can be used without a VR100 connected to the computer by selecting the serial number "Virtual". This allows sensor transmitter information to be entered and saved (see section 3.8) in preparation of being uploaded to the receiver without the receiver being physically connected.

CAUTION: Verify the receiver you are communicating with is **the intended unit**, particularly before erasing receiver memory files or changing setups. Communication can occur with any powered VR100 receiver connected to the PC.

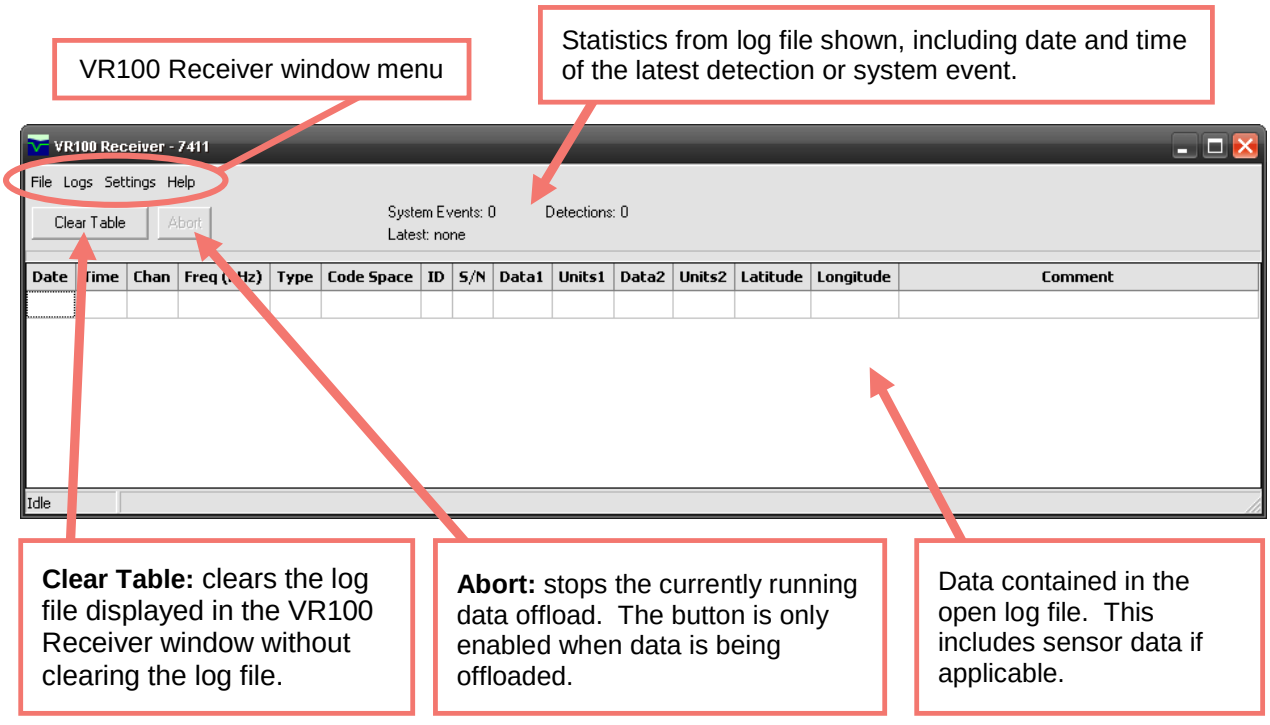
3.3 VR100 Receiver Window

The quickest method to open a VR100 Receiver window (see section 3.2) is to double-click the desired receiver's serial number in the list. A receiver window can also be opened by highlighting the desired serial number and clicking the "Open" button at the bottom of the window.

Receiver Window

When a receiver is opened from within the Receiver Management window, it opens a VR100 Receiver window like the one shown below. The receiver's serial number is displayed in the top left corner to identify which receiver is associated with this window.

When more than one receiver is open, then more than one VR100 Receiver window is open. One VR100 Receiver window is assigned to each receiver opened in the Receiver Management window. Commands performed in the VR100 Receiver window affect only the receiver associated with that window.


VR100 Receiver window menu
Statistics from log file shown, including date and time of the latest detection or system event.
VR100 Receiver - 7411
File Logs Settings Help
Clear Table
Abort
System Events: 0
Latest: none
Detections: 0
Date Time Chan Freq (kHz) Type Code Space ID S/N Data1 Units1 Data2 Units2 Latitude Longitude Comment
Idle
Clear Table: clears the log file displayed in the VR100 Receiver window without clearing the log file.
Abort: stops the currently running data offload. The button is only enabled when data is being offloaded.
Data contained in the open log file. This includes sensor data if applicable.

3.4 Offload Data

The Logs menu is used to offload, or copy, the data stored on the VR100 receiver to a log file on the computer. There are two options in loading data, to retrieve all the data stored in the VR100 (Get All Data) or to only retrieve the data stored since the last upload (Get Recent Data).

When data is loaded to the computer, it's actually copied to the computer. The original copy is still in the receiver's memory. Once receiver log data has been saved, you may erase the data from the receiver (see section 3.6).

To offload data from the VR100:

1. Open the VR100 Receiver window (see section 3.2) for the receiver containing the data.
2. Select either Get All Data or Get Recent Data (see below for descriptions) depending on the amount of data you want offloaded.
3. Wait while the data offloads to the computer, which will finish in less than four minutes.
4. Save or export the log data to a file depending on the desired file type. To create a log file, use the Save feature (see section 3.5) but to create a .csv file, use the Export feature (section 3.7).

3.4.1 Get All Data

The Get All Data command loads all data from the VR100 receiver to the computer. This could take up to four minutes, depending on how much information is stored in the receiver's memory. The loaded data is stored as a log file (see section 4.1).

3.4.2 Get Recent Data

The Get Recent Data command loads any new data stored in the VR100 receiver since the last command was given to load data. If the Get All Data has never been given to this receiver, or if a different computer is being used since the last Get Recent Data command, then the computer will get all the stored data.

NOTE: The method used to mark which data has been loaded to the computer is stored on the computer. If the Get Recent Data command is sent from a different computer, then the computer doesn't have a record of a previous upload and will load all the data from theVR100.

3.5 Save Data

The data retrieved from the VR100 receiver can be saved as a ZLOG file (see section 6.6.1). The Save As… feature in the VR100 Receiver window opens the Save Current Log As window to allow the log file to be named. The file is saved with the ".zlog" extension to distinguish it as a log file.

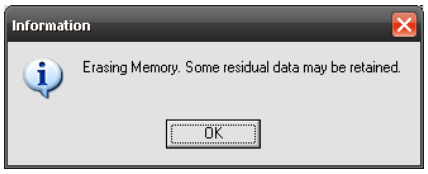
ALWAYS save your data ***before*** erasing the VR100 memory.

3.6 Erase VR100 Log

The *Erase VR100 Log* command will erase the event log (memory) in the VR100 receiver. This is the same command that is seen after data is loaded from the receiver to the computer.

When the command is given, a verification screen is displayed to confirm that the receiver's log should be erased. The screen also indicates that some of the stored data may not have been loaded to the PC. This is a reminder to upload the data from the VR100, if you want to keep the data, before erasing the memory.

To continue, click the "Yes, Erase the log" box and then the Erase button. The Erase button isn't enabled until the Yes box is checked.



When the memory is being erased, the Information window shown below is displayed on the screen to indicate the erase command is being executed. It also indicates that some residual data may be retained in the receiver's memory.

Data is initially stored in a small, volatile memory buffer. When the buffer is full, that data is moved to non-volatile long-term memory. The *Erase VR100 Log* command erases all data in the long-term memory but not data in the buffer memory. This feature allows the VR100 to continue to record new data during the erase process.

The data in the buffer, which is the most recent data, continues to be stored until the buffer is full and is then moved to the long-term memory. This means that the data in the buffer will be loaded to the computer with the next upload and may appear as duplicated data. This can be avoided by using the *Get Recent Data* command (see section 3.4.2).

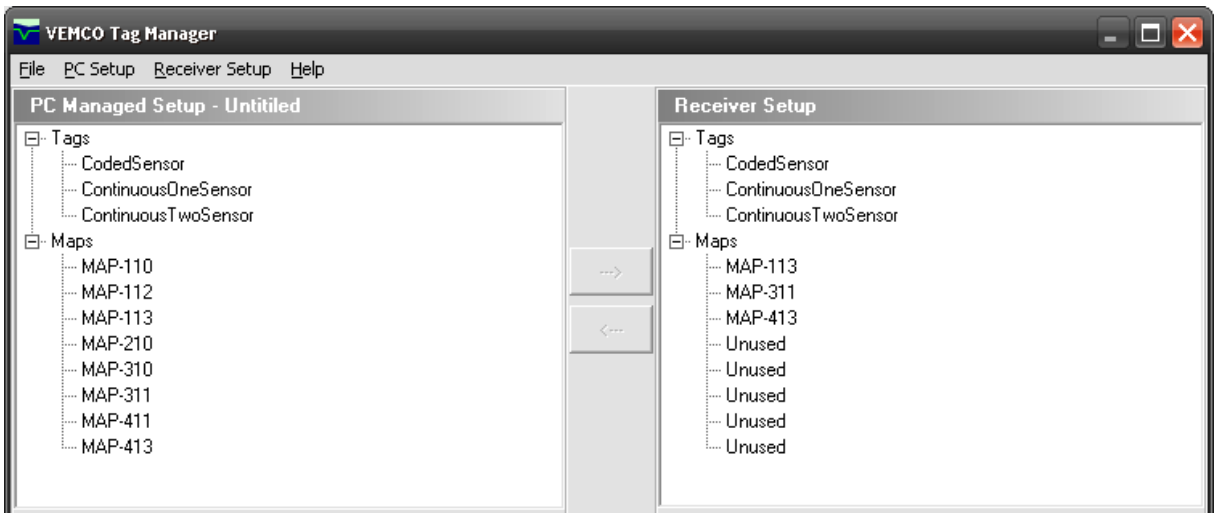
3.7 Export

The data retrieved from the VR100 receiver can be exported as a CSV file (see section 6.6.2). The Export feature opens the Export Current Log window to allow the comma delimited file to be named. The file is saved with the ".csv" extension to distinguish it as a Comma Separated Variables file.

3.8 Tag Manager

The *Tag Manager* window allows sensor tag setups to be created, or edited, and then transferred to VR100 receiver. A group of sensor tags can be saved as a setup file and opened at a future time. The *Tag Manager* window opened by selecting *Tag Manager* in the *Settings* menu of the *VR100 Receiver* window.

The left half of the *Tag Manager* window is called the *PC Managed Setup* and is used to enter and edit sensor tags. The information seen in the *PC Managed Setup* list is the tag/map setup contained in the PC software. The right half of the window is called the *Receiver Setup* and is the actual tag/map setup contained in the VR100 receiver. When the *Tag Manager* window is opened, the software automatically requests the current setup from the receiver and displays it in the *Receiver Setup* half of the *Tag Manager* window.



The setup for tags and code maps can be passed between the PC and the receiver by using the arrow buttons in the middle of the window or by dragging and dropping items from one pane to another. To copy a sensor transmitter from the *PC Managed Setup* list (on the left) to the *Receiver Setup* (on the right), select the desired tag by clicking it once with the mouse and then click the right pointing arrow in the middle of the window. The tag now also appears on the right half of the window and has been automatically sent to the VR100.

> To select more than one tag at the same time, select the first tag then hold the Control key on the computer's keyboard while you select the other tags with the mouse arrow. Press the Shift key instead of Control to select blocks of tags.

3.8.1 Add a Tag

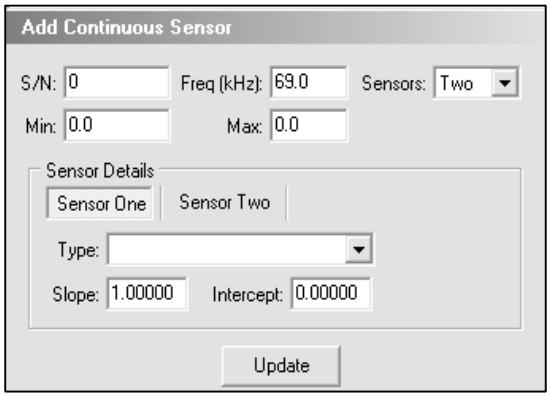
Tags with a sensor should be entered in the VR100 receiver before detections occur.

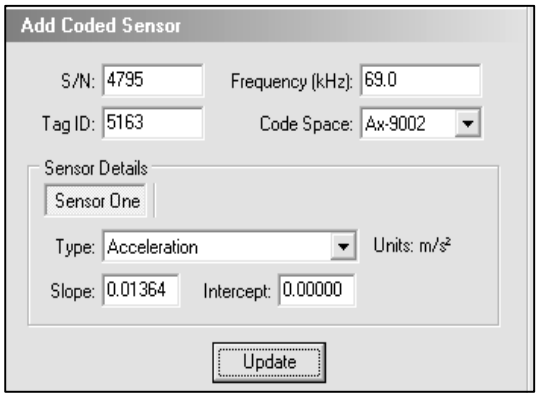
Only tags with sensors need to be entered in the receiver. Pingers (tags without sensors) don't need to be entered.

The *Add* sub-menu (in PC Setup) allows a sensor tag to be added. Adding a tag refers to entering a sensor transmitter's information so the received data can be displayed in the correct units, which must be done for each sensor transmitter being used with the VR100.

A sensor transmitter's information must be entered in the VR100 for the data to be displayed correctly. A new sensor transmitter can be added by doing the following the steps.

1. Select the tag type (coded sensor, continuous one sensor, or continuous two sensor) by either using the *PC Setup* menu or by clicking the desired sensor type in the *PC Managed Setup* on the left half of the screen. In either case, the bottom left corner of the *Tag Manager* window will display data entry boxes similar to the two samples shown below. Initially the boxes are empty, as seen in the sample window on the left. The sample window on the right has the information entered and is ready for the Update button to be clicked.





2. Enter the information as identified in the window (see example above on the right). The information needed is listed below by tag type. The information can be found in the Transmitter Specification manual shipped with the sensor transmitters.

Setup Info for Coded Sensor Tag

- Serial number
- Frequency in kilohertz (kHz)
- ID number
- Code Space – select from the pull-down list
- Sensor type – temperature, depth or acceleration
- Slope
- Intercept

Setup Info for Continuous One-Sensor Tag

- Serial number
- Frequency in kilohertz (kHz)
- Number of sensors – One
- Minimum period possible, in milliseconds (ms)
- Maximum period possible, in milliseconds (ms)
- Sensor type – temperature or depth
- Slope
- Intercept

Setup Info for Continuous Two-Sensor Tag

- Serial number
- Frequency in kilohertz
- Number of sensors (Two)
- Minimum period possible (milliseconds)
- Maximum period possible (milliseconds)
- Sensor One:
  - o Sensor type (typically temperature)
  - o Slope
  - o Intercept
- Sensor Two:
  - o Sensor type (typically pressure)
  - o Slope
  - o Intercept
- Sync in milliseconds

3. Click the Update button. The tag is now added to the list shown in the *PC Managed Setup* half of the window (on left).

The tag just setup has not yet been entered in the VR100 receiver. It must be transferred to the *Receiver Setup* list (see section 3.8.3).

Adding a tag does not automatically send it to the VR100.
Transfer the tag to the *Receiver Setup* list to add it to the VR100.

NOTE: For coded two-sensor tags, two separate sensor tag entries are required – one for each tag ID (sensor). Since the VR100 does not allow duplicate serial numbers in the sensor database, the serial number for the second sensor entry must be different than the first sensor entry. We recommend that you use the serial number provided on the specification sheet for the first sensor entry, and the same serial number with a prefix for the second sensor entry.

For example, use "20" as the prefix: Sensor 1 SN: 1034857 Sensor 2 SN: 201034857

3.8.2 Edit a Sensor Tag

Sensor transmitters that have already been entered can be edited. Follow the steps below to edit an existing sensor transmitter.

1. Highlight the desired tag in the *PC Managed Setup* list (left side of *Tag Manager* window). The information already entered about that tag is displayed in the bottom left corner of the window but is not accessible for editing.
2. Click the "Edit" box in the bottom left corner of the window.
3. Edit the tag information as needed.
4. Click the Update button.

3.8.3 Transfer PC Managed Setup List to Receiver Setup List

The tag and map information listed in the *PC Managed Setup* half of the *Tag Manager* window (see section 3.8) must be transferred to the *Receiver Setup* half of the window to be downloaded to the VR100 receiver. Follow the steps listed below to perform such a transfer.

1. Open the *Tag Manager* window (see section 3.8).
2. Enter the tag information by either entering it in the window (see section 3.8.1) or by opening a previously saved resource file (see section 6.6.3.1).
3. Select the desired tag(s) or map(s) in the *PC Managed Setup* list (left half of window) by clicking it once with the mouse.
   TIP: To select more than one tag at once, select the first tag then hold the Control key on the computer's keyboard while you select the other tags with the mouse arrow. Press the Shift key instead to select blocks of tags.
4. Click the right-pointing arrow located in the middle of the *Tag Manager* window or drag and drop the selected tag(s) to the *Receiver Setup*. The selected tag setup is transferred to the *Receiver Setup* list (right half of window) and automatically transferred to the VR100.

3.8.4 Save Tag and Map Setups

The tag and map setups that you've created in VR100HS can be saved as a resource file (see section 6.6.3) and opened at a later time or on a different computer. This allows multiple VR100 receivers to quickly be setup with the same settings. Select "Save" or "Save As" in the File menu found ***in the Tag Setup window*** to save the current settings as a resource file.

Save tag and map setups by creating a resource file.

3.8.5 Import Tags

The import feature in the *Tag Manager* window allows multiple resource files to be combined into one file. Follow the steps listed below to merge resource files.

1. Open one of the files to be merged (see 6.6.3.1).
2. Select Import from the *PC Setup* menu in the *Tag Manager* window. The *Import* window will open.
3. Select the second resource file to be merged and click the "Open" button.
4. Repeat steps 2 and 3 until all the desired resource files are merged.
5. If desired, save the merged file using the *Save As…* feature.

The merged file will not contain any duplication of information. For example, if the sensor transmitter with the serial number 6739 is setup in two different resource files, it will only appear in the merged file once.

3.8.6 Refresh Lists

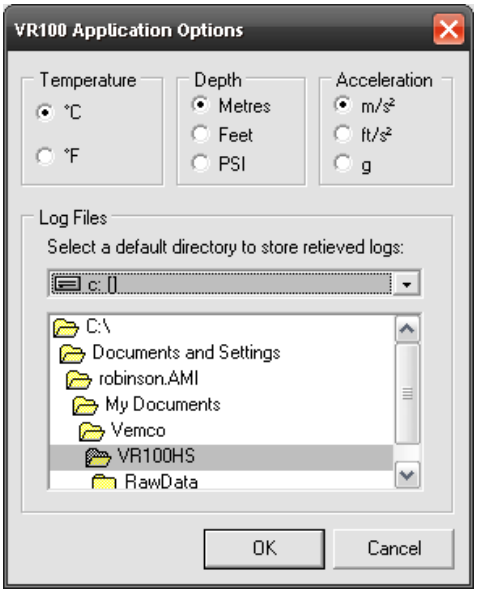
The *Refresh* command in the Receiver Setup menu retrieves the current setup (sensor tags and maps) from the receiver and displays that setup in the right side of the *Tag Manager* window (called *Receiver Setup*). The *Refresh* command is automatically executed each time the *Tag Manager* window is opened.

3.9 Options…

There are four options that are set in the Options window, shown here. Three of these options relate to the units used to display temperature, depth and acceleration data. These settings are global. For example, if °C is selected for temperature units, then all the temperature data displayed by the software is in degrees Celsius (°C).

VEMCO publishes sensor calibration data in SI units (°C, meters, m/s^2). Slope and intercept values for sensor tags should always be entered directly from the tag data sheet in SI units. The PC software will automatically convert from the base SI units to the units configured in this dialog for all displayed tag data.

The default location for saving log and sensor data files is also selected in the Options window.



4 In the Field

There are two major tasks that are usually performed in the field. One of those tasks is manually tracking a tag using a directional hydrophone. The other popular task is using the VR100 as a deck-box to communicate with a VEMCO receiver capable of acoustic communication.

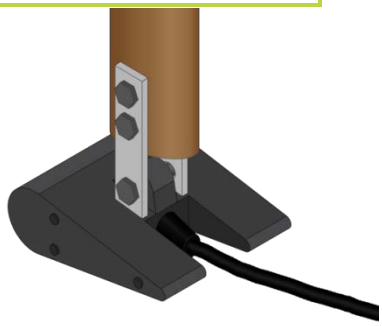
4.1 Manual Tracking

Manually tracking a tag in the field refers to using a directional hydrophone, such as the VH110, to follow the direction in which the tag signal is strongest. Manual tracking can follow a continuous tag or a coded tag, although continuous tags are easier to follow because they don't have long delays between pings as coded tags do.

4.1.1 Hydrophone Deployment Facts/Tips

Hydrophone Type	Deployment Tip
Omni-directional (VH165, VH180, VHTx)	Attach an omni-directional hydrophone to a weighted rope to counteract buoyancy and to put the hydrophone to the desired depth. Do not put strain on hydrophone cable! The amount of weight needed depends on the flow rate in the area. Transponding hydrophones are weighted but may need additional weight in high-flow areas.
Both	For better results, turn off the boat motor and the depth sounder to reduce acoustic interference when using the VR100.
Directional (VH110, VH180-D)	The attachment hole on a directional hydrophone is 11/16" diameter. The figure below shows one method used to mount the hydrophone to a pole.
Directional (VH110, VH180-D)	Mark the top of the pole to correspond with the location of the element as the element will be submerged while tracking. The direction the element is facing when the strongest signal is detected is the direction of the tag.
Directional (VH110, VH180-D)	If the animal being tracked is operating in deeper water, then adjust the angle of the directional hydrophone so it's pointing downward as you get closer to the tag. If you don't adjust the angle, you might miss the animal because the hydrophone is looking at the surface of the water instead of into its depth.

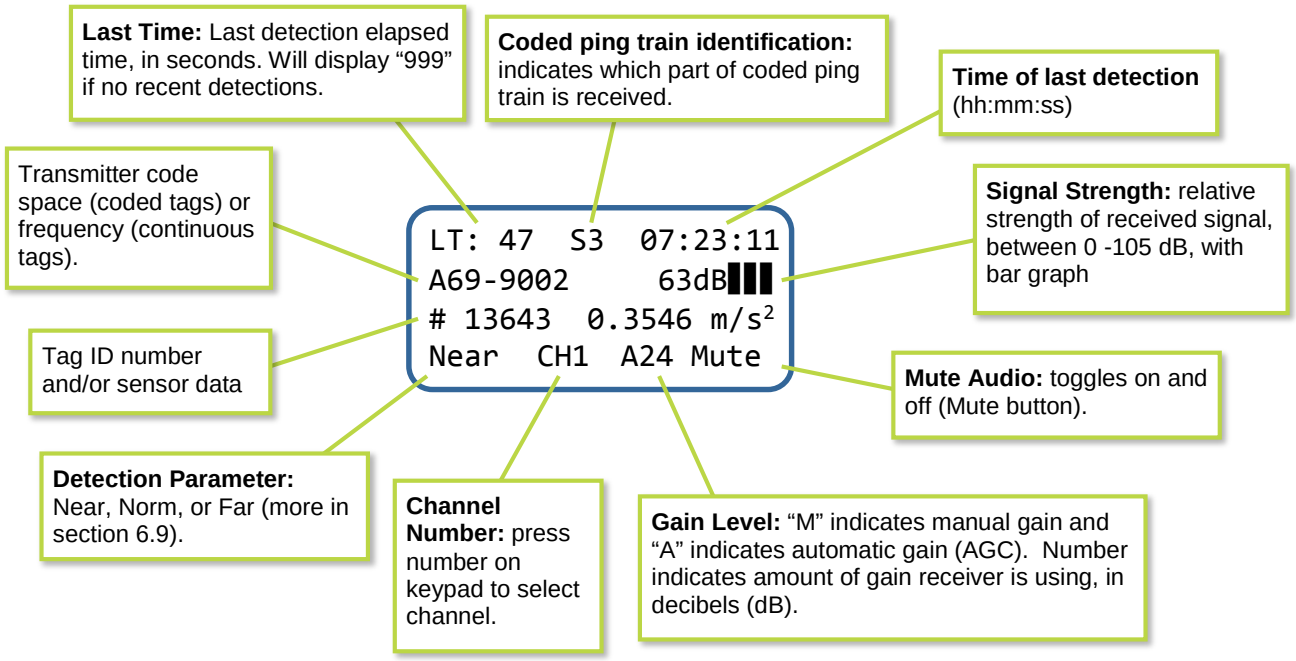
The VR100 can be used while it is plugged in to an external power source, but this does introduce additional noise into the receiver and is slightly less effective than using the VR100 with battery power.



4.2 Monitoring

The Monitor feature displays real-time information, allowing active tags to be monitored or tracked. A sample of how the screen appears in Monitor mode is shown below with labels identifying the information shown on the screen. Further explanation of the information is given in the section 6.4.

4.2.1 Monitor Screen


Last Time: Last detection elapsed time, in seconds. Will display "999" if no recent detections.
Coded ping train identification: indicates which part of coded ping train is received.
Time of last detection (hh:mm:ss)
Transmitter code space (coded tags) or frequency (continuous tags).
Signal Strength: relative strength of received signal, between 0 -105 dB, with bar graph
LT: 47 S3 07:23:11
A69-9002 63dB
13643 0.3546 m/s²
Near CH1 A24 Mute
Tag ID number and/or sensor data
Mute Audio: toggles on and off (Mute button).
Detection Parameter: Near, Norm, or Far (more in section 6.9).
Channel Number: press number on keypad to select channel.
Gain Level: "M" indicates manual gain and "A" indicates automatic gain (AGC). Number indicates amount of gain receiver is using, in decibels (dB).

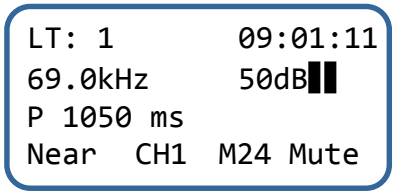
4.2.2 Manually Tracking a Tag

Tracking a tagged marine animal requires a directional hydrophone. The VR100 receiver is compatible with the VH110 directional hydrophone. The directional hydrophone must be mounted on the end of a pole so it can be rotated. It's also helpful to mark which section of pole is facing in the same direction as the black, shiny section of the hydrophone that's surrounded by cork (see arrow in photo above). This black section is the signal sensitive section of the hydrophone.

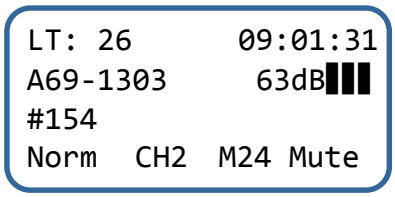
After a channel in the VR100 has been setup to detect the tag (see section 2.3) and the tag has been deployed, use the steps below to track the tag using the VR100.

From the Main Screen:

1. Select Monitor by pressing the left selection button. A screen on the VR100 will appear similar to the sample below.
2. Press the number on the keypad corresponding to the channel number to be monitored (section 2.3 explains how to setup channels).
3. Use the left selection button to select the desired level of Detection Parameter (see section 6.9). The sample below has been set to "Near". This setting is made on a per-channel basis so a channel must be selected (step 2) before this step can be performed.
4. Verify that the frequency (if it's a continuous tag) or code-space (if it's a coded tag) shown is correct. If it isn't, then the channel setup must be edited (see section 2.3).
5. Deploy the directional hydrophone (section 4.1.1 contains tips).
6. Use the audio output from either the speaker or the headphones to listen for the deployed pinger. You may need to rotate the hydrophone to survey the area.



7. Ensure the receiver is in manual gain mode and adjust the gain so that the pings are strong but not saturating the receiver. Use the signal strength meter as a guide (signal strength varies from 0 to 105 dB; try to keep it in the 60 – 80 dB range).
8. Watch the third line for either the tag's ping period (in milliseconds) if it's a continuous tag or the ID number if it's a coded tag. The "P" indicates that the received ping was from a continuous pinger. The time, in seconds, since the last ping was received is shown in the top left corner. If the length of time is very large, the display will show 999 to indicate there haven't been any recent detections.



9. Slowly rotate the hydrophone rod in one direction. If the signal gets louder and stronger (the signal strength level and bar graph increase) then continue to rotate the hydrophone in that direction. If the signal gets softer and decreases, then reverse the rotation. When the signal is its strongest, the hydrophone is pointing in the direction of the tag.
10. Move in the direction the hydrophone is pointing and watch/listen to the signal strength. If the signal strength decreases, repeat this step until it increases again. If the animal being tracked is operating in deeper water, then adjust the angle of the directional hydrophone so it's pointing downward as you get closer to the tag. If you don't adjust the angle, you might miss the animal because the hydrophone is looking at the surface of the water instead of into its depth.
11. If necessary, adjust the gain so that the pings are strong but not saturating the receiver.
    Note: The gain setting is not critical and in most circumstances satisfactory performance can be achieved without frequent gain changes.

Continue this process of following the signal strength and adjusting the gain until the signal strength is strong in all directions (rotating the hydrophone doesn't change the signal strength). The tag is below the hydrophone.

TIP: If the animal being tracked is operating in deeper water, then adjust the angle of the directional hydrophone so it's pointing downward as you get closer to the tag. If you don't adjust the angle, you might miss the animal because the hydrophone is looking at the surface of the water instead of into its depth.

4.2.3 Using Signal Strength and Gain when tracking

When tracking a tag using the VR100 and a directional hydrophone (the VH110 for example), the signal strength will increase as the hydrophone approaches the tag. The gain must be set to manual ("M" appears in the Monitor screen – see section 4.2.1) during this procedure.

When the signal strength bar graph is near full scale, the manual gain should be reduced so meter variations will indicate transmitter direction as the hydrophone is turned. If the signal level indicator is at the bottom of the scale, the gain should be increased to detect meter variations. If the gain is too high, the signal can be saturated and difficult to detect.

The signal strength reading is a relative measure of the voltage level present at the receiver input (0dB = minimum measureable voltage, 105dB = full scale voltage). It is strictly a relative measure of signal strength and **cannot** be used to measure the output power of a transmitter in terms of dB re 1uPa @ 1m.

4.2.4 Select Channel to Monitor

There are eight channels that can be simultaneously monitored, but only channel can be viewed at a time in the VR100 Main screen. To select the channel to be viewed in the screen, press the number on the keypad corresponding to the channel number to be monitored (section 2.3 explains how to setup channels).

4.2.5 Log GPS Coordinates

A GPS reading is automatically stored in the VR100's memory with each detection if the GPS receiver is "locked". Manual GPS readings can be taken while in the Monitor screen (see section 4.2.1) and stored to memory by pressing the LOG GPS button on the front panel of the receiver. A message will briefly appear on the VR100's display to verify that the location has been stored. If the GPS receiver does not have a position fix when manually logging GPS readings, the VR100 will report "ERROR! No GPS fix."

This GPS reading is the location of the VR100, not necessarily the location of the hydrophone that is detecting the pings or the tag.

4.3 Check Status

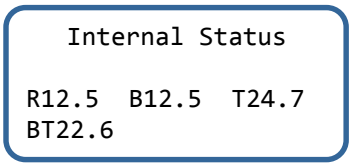
4.3.1 Battery Life

The battery voltage level can be viewed on the VR100 receiver display by following the steps listed below.

NOTE: If an external power source is connected to the receiver, then the voltage reported by the VR100 is the voltage of the external power supply and not the internal battery. Turn off the receiver, unplug the external power supply, and turn the VR100 on to read the battery voltage with the steps below.

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press "2" on the keypad.
3. Press "4" on the keypad.



The values displayed from left to right are as follows:

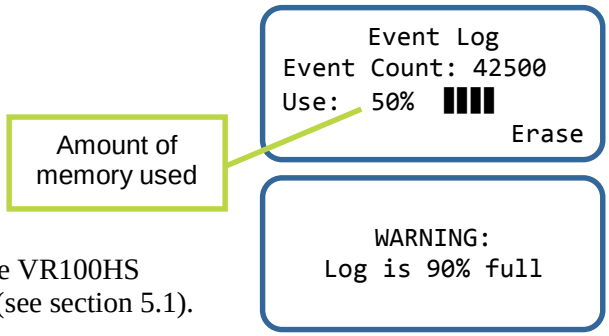
R – regulated voltage
B – battery voltage
T – internal temperature (°C)
BT – battery temperature (°C). This is not available on the VR100-100 receivers (displays "- -").

4.3.2 Memory Used

The amount of memory used in the VR100 can be viewed while you are using the VR100. A warning message appears on the display when the memory reaches 90%, 95%, or 100% full. The message also appears when the VR100 is turned on if at least 90% of the memory is already used. Offload the data (see section 3.4) and erase the log memory.

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press "2" on the keypad.
3. Press "5" on the keypad.



The VR100 memory can be erased while connected to the VR100HS software (see section 3.6) or when it is being used alone (see section 5.1).

WARNING

When 100 % of the log memory is full, the memory must be erased before more events can be logged; old data is not deleted, but ***new data will not be stored*** until the memory is erased. To prevent loss of data, offload the VR100's memory to your PC before erasing the memory.

4.4 Acoustic Communication

A beautiful feature of a receiver is the ability to communicate with it while it is deployed. This section covers the main tasks that would be performed when communicating with a receiver. A screen is shown with each step, but the buttons you need to press are explained in section 1.4.3. A transponding hydrophone must be connected to the VR100-200 receiver for two-way communication.

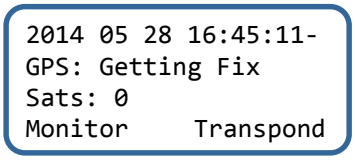
When performing these tasks in air, keep in mind that the distance the acoustic signals can travel is greatly reduced in air and the caged section of the hydrophone should be within 200 mm (8”) of the hydrophone on the receiver.

4.4.1 Establish Acoustic Communication

Acoustic communication between a VR100-200 receiver and a receiver requires a transponding hydrophone to be attached to the VR100-200. The steps listed below are taken to establish acoustic communication.

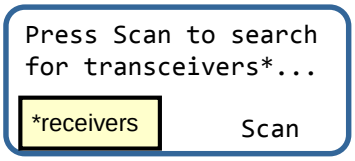
STEP 1

Select “Transpond” in the main screen (right selection button).



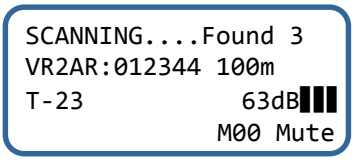
STEP 2

Scan for any nearby receivers by selecting “Scan” (right selection button). The “wake-up” command is broadcast in the area – a count-down is shown on the screen.



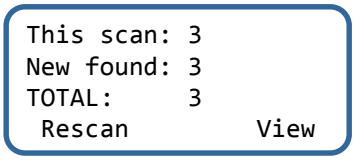
STEP 3

Wait again while the VR100-200 listens for the units in the area to respond. A count-down (“T-x” where x is the seconds) is again shown on the screen



STEP 4

Select “Rescan” if the number of receivers found does not match the expected number and you want to repeat the scan, or press “Select” to view a list of the units that responded along with the over-all distance from the hydrophone to the receiver.

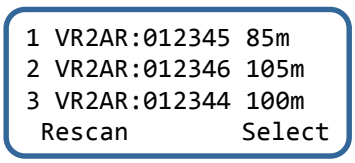


STEP 5

Select the desired unit from the list of receivers by either moving through the list using the direction arrow buttons and then pressing the right selection button (under “Select” on the display), or by pressing the associated number on the keypad. For example, pressing the “2” button on the keypad will select VR2AR serial number 12346.

The rest of the units will wait in case you want to talk to them after you’re finished with your first selection (i.e. you don’t have to scan again).

Pressing the left selection button, under “Rescan” on the display, will repeat Steps 2 and 3.

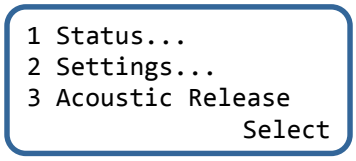


4.4.2 Get Status Information

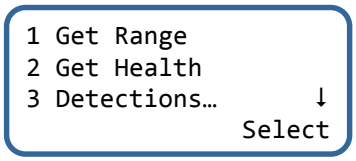
The features in the Status menu allow access to the following information: absolute range, vertical depth, pressure (psi), battery remaining, memory remaining, vertical tilt, number of detections stored, temperature, and firmware version. The steps below will walk you through the process of getting this status information.

STEP 1

Select Status from the list, or press the "1" button on the keypad to display the list of status options (on right).

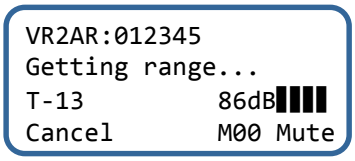


The down-arrow just above "Select" indicates the list continues off the screen. Use the arrow keys to move up and down the list.



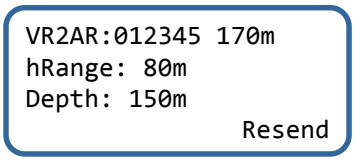
STEP 2

Select "Get Range" first to establish a communication link. This first communication can take longer as the VR100-200 and the receiver must establish the link. Getting a response to a "Get Range" command after communication is established is faster.



The range information listed includes (from top to bottom):

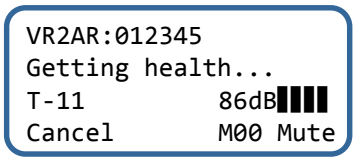
- absolute range
- horizontal range
- depth range



Press the MENU button to return to the screen in Step 1.

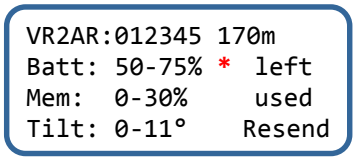
STEP 3

Select "Get Health" to learn the battery remaining (range), memory used (range), and tilt (range).



The health information listed includes (from top to bottom):

- absolute range
- range of battery capacity remaining
- range of memory amount used
- range of tilt of receiver, where 0° is vertical



Press the MENU button to return to the screen in Step 1.

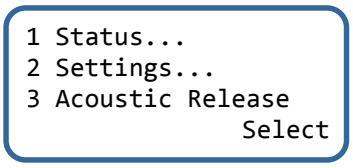
* The remaining battery capacity displayed on the VR100 (Batt: xx%) is a soft counter intended to *estimate* the unit's remaining battery life. For the counter to display the correct battery capacity, you must connect to VUE and initialize the receiver each time the receiver battery is replaced (see your receiver manual for details).

4.4.3 Get Detection or Pings Stats

Receivers can report a rough number of detections or pings stored in the memory. This can be the total number since the receiver was last initialized, the amount since the last data offload, or the amount since the last mark was made in the file. The detection amounts are shown as ranges for communication purposes. Exact amounts will be shown when the receiver is connected to VUE via *Bluetooth*, as explained in the receiver manual.

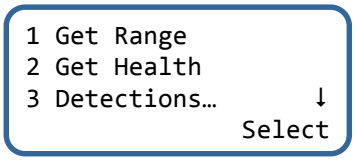
STEP 1

Select "Status…" from the list, or press the "1" button on the keypad to display the list of status options (on right).



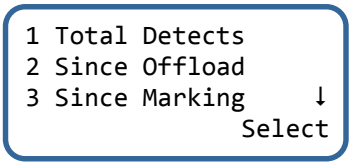
STEP 2

Select "Detections" (#3) to get an idea of the number of detections stored in the memory.

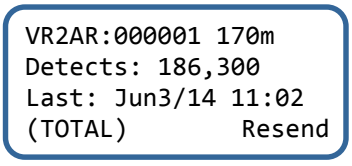


STEP 3

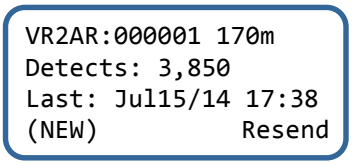
Select either "Total Detects" (#1), "Since Offload" (#2), or "Since Marking" based on the descriptions below. In either case, the VR100-200 will request the information from the receiver, displaying the "T-" countdown during the communication steps (transmission and reception).



Total Detects – displays the number of detections stored in the receiver since it was last initialized and the memory was erased. Initialization can only occur while the receiver is communicating with VUE software. This is the total number of detections stored in the receiver, old (offloaded) and new (not offloaded).



Since Offload – reports the number of detections stored in the receiver since the last data offload to VUE. This is the number of detections that have not been offloaded to VUE, or are new detections.



Since Marking – reports the number of detections stored since the last "Mark All" command was sent.

Mark All – places an electronic "mark" in the internal memory for both the detection counter and the ping counter. This must be used before the "Since Marking" feature. It also clears all detection counts from the Watch Table (see section 4.4.4).

STEP 4

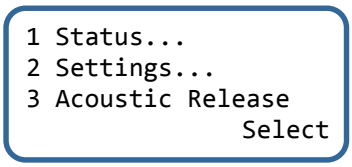
Use the MENU button to return to the main transponding screen.

4.4.4 Check Watch Table

The Watch Table in a receiver must be setup in VUE before deployment. With this table of tags to "watch" in place, the receiver can report if one of the up to 128 tags in the Watch Table was in the area, approximately how many times that tag was detected, and the approximate time of the last detection.

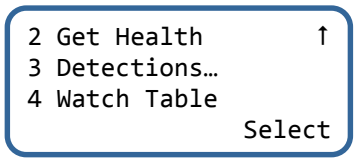
STEP 1

Select "Status…" from the list, or press the "1" button on the keypad to display the list of status options (on right).



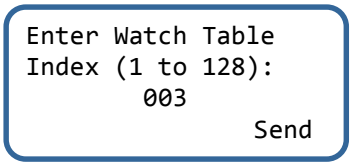
STEP 2

Select "Watch Table" (#4) to get an idea of the number of detections stored in the memory.



STEP 3

Enter the Watch Table Index number associated with the desired tag on the keypad (1 – 128), or press the up arrow until you reach the Index number.

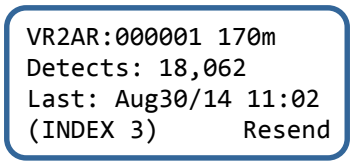


Select "Send".

TIP: Keep a copy of the table and select the desired number on the keypad instead of using the arrow buttons.

STEP 4

Wait while the information passes between the VR100 and the receiver. The result will be shown on the VR100 screen as shown. In this example, the tag is Index number 3.



STEP 5

Use the MENU button to return to the main transponding screen.

4.4.5 Performing Acoustic Release (VR2AR only)

The VR2AR receiver has the capability to release from its mooring and, with the proper floatation attached, rise to the surface. Deploying a VR2AR is explained in the VR2AR user manual. Below are the instructions for sending the release command from the VR100-200 receiver to the VR2AR.

STEP 1

Select "Acoustic Release" (#3) from the main transponding menu to begin the release process.

```
1 Status...
2 Settings...
3 Acoustic Release
                Select
```

STEP 2

Select "Arm" (#2) to let the VR2AR know that you are about to send a command to release the mooring lug. This acts as a safety feature to prevent a release command from accidentally being sent to a receiver.

Press the MENU button to return to the Acoustic Release menu.

```
1 Status
2 Arm
3 Activate
                Select
```

STEP 3

Select Activate to send the release command. A 5-digit PIN code must be entered before the VR100 will continue.

```
VR2AR:000001 0m
Enter the PIN code:
       00000
              Activate
```

After you've entered your confirmation code, select "Activate" (right selection key). The status is reported as "Opening" until the motor in the VR2AR has completed its task, at which time the status changes to "Open." With the proper amount of buoyancy attached to the VR2AR, it should be rising to the surface.

STEP 4

Select "Status" (#1) and wait until the VR2AR's status is shown (see below). "Opening" indicates that the mooring lug is currently being expelled from the VR2AR; "Open" means the lug is expelled and the VR2AR has been released.

```
1 Status
2 Arm
3 Activate
4 Get Pressure  Select
```

Watch the depth value decrease, indicating that the VR2AR is rising. The status also reports the "hRange" or the horizontal range to the VR2AR. If the depth is listed at (or close to) "0m" then you know the receiver is at the surface and the hRange indicates the distance from the boat.

```
VR2AR:000001 150m
Status: Open
Depth: 130m          ↓
                Resend
```

The amount of battery life remaining in the AR release battery is also shown.

STEP 5

Use the MENU button to return to the main transponding screen.

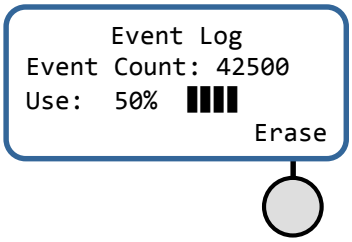
5 Maintenance

5.1 Clear Memory

When 100 % of the log memory is full, the memory must be erased before more events can be logged. The memory is erased from either the Event Log screen (described below) or from within the PC software (see section 3.6), but the ***memory should only be erased after the log has been copied to a computer*** (see section 3.4).

To erase memory using the VR100, from the Main menu on the VR100:

1. Select Config (see section 6.1.2.1).
2. Press "5" on the keypad.
3. Press the right selection button to erase the data. It's strongly recommended that data be loaded to a computer using the VR100HS software ***before*** the memory is erased.
4. Confirm the erasure of the data by pressing the button identified in the confirmation window.



Erasing the event log will only erase the events that have occurred to the VR100 receiver and not the channel settings or the sensor tag information.

> Erasing the VR100 memory will only erase the events that have occurred to the VR100 receiver and not the channel settings or the sensor tag information.

5.2 Charge Battery

Follow the steps listed below to charge the VR100's battery:

1. Place the receiver away from direct heat sources (including direct sunlight) and in a horizontal position so the front panel is facing up. It is best to charge the VR100 at room temperature.
2. Select a battery charger based on the power supply type, either AC or DC. Both chargers are shown to the right. The AC charger may require an adapter plug, depending on your location.

VR100 Power Charger

WARNING

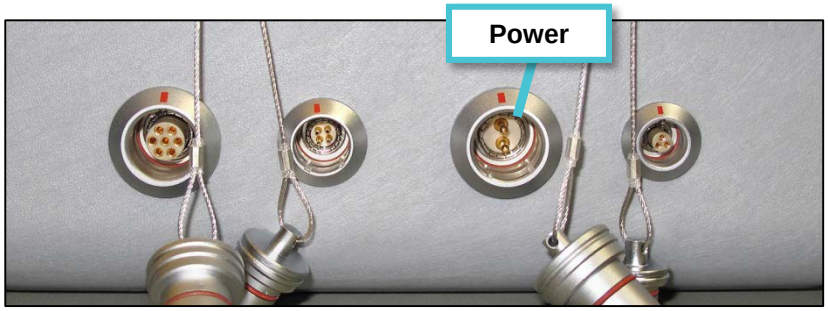
VR100 must be ***horizontal with the front panel facing up*** when charging.

Continued…

3. Plug the metal connector on the supplied battery charger into the Power connector on the side of the VR100 case (see photo below). The connector on the charger cable will only fit the Power connector on the receiver and only in the correct orientation.
4. Plug the other end of the AC battery charger into a 50/60 Hz, 100 to 240V AC power source, or the DC battery charger into 12VDC power source.

More information about the battery and long-term care is found in section 6.3.

VR100 Car Charger cable



The VR100 battery fully charges in 14 hours at room temperature.

5.3 Storage

The VR100's battery slowly discharges even when not in use and eventually will become fully discharged during long-term storage, which may harm the battery. If the VR100 is to be stored for an extended time, then protect the battery by following the suggestions listed below.

1. Fully charge the battery before placing the VR100 in storage
2. Re-charge the battery every 3-4 months

Recommendations for maximizing the battery's service life are found in section 6.3.2.

Make sure you also clean and dry your VR100 receiver after every use and store it in a dry location at room temperature.

WARNING

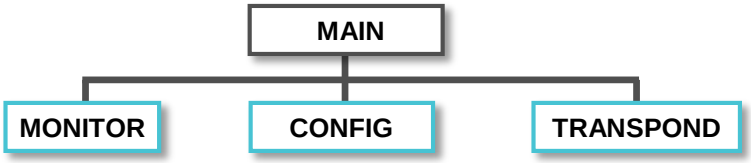
Ensure the battery is charged every three to four months during storage. If not, the battery can become fully depleted and permanently damaged (section 6.3).

Maintaining your gear regularly and testing the receivers at least three weeks before planned field work will help you get the most out of your field work experience.

6 Additional Information

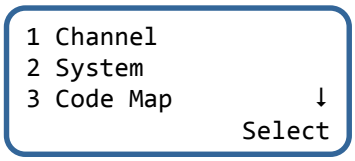
6.1 Menu Outlines

VR100 operations are separated into three groups: monitoring, configuring, and transponding (transponding is only available on the VR100-200 model and requires additional equipment). Two of these groups, configuring and transponding, contain multi-layered menu structures that are explained in sections 6.1.2 and 6.1.3. The VR100HS software also contains a menu structure and has been included in section 6.1.4.



Each sub-menu option is associated with a number shown on the screen to the left of the selection, as shown in the screen below. Selecting a sub-menu option can be performed by using the up and down arrows on the front panel to move the cursor to the desired sub-menu and then pressing the right selection button for the Select command. A down arrow in the screen indicates that the list extends downward and the remainder of the list can be accessed by using the down button. An up arrow will appear in the top line if the list extends above the items shown.

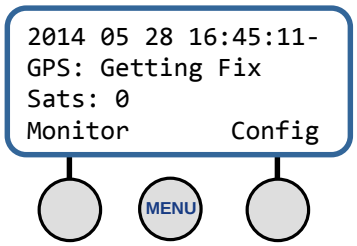
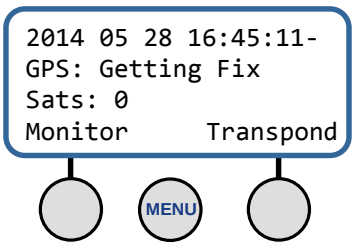
It's also possible to select a sub-menu by pressing the corresponding number on the keypad. The menu numbers are included in the menu structure maps at the beginning of sections 6.1.2 and 6.1.3 for easy reference.



6.1.1 VR100 Main Screen

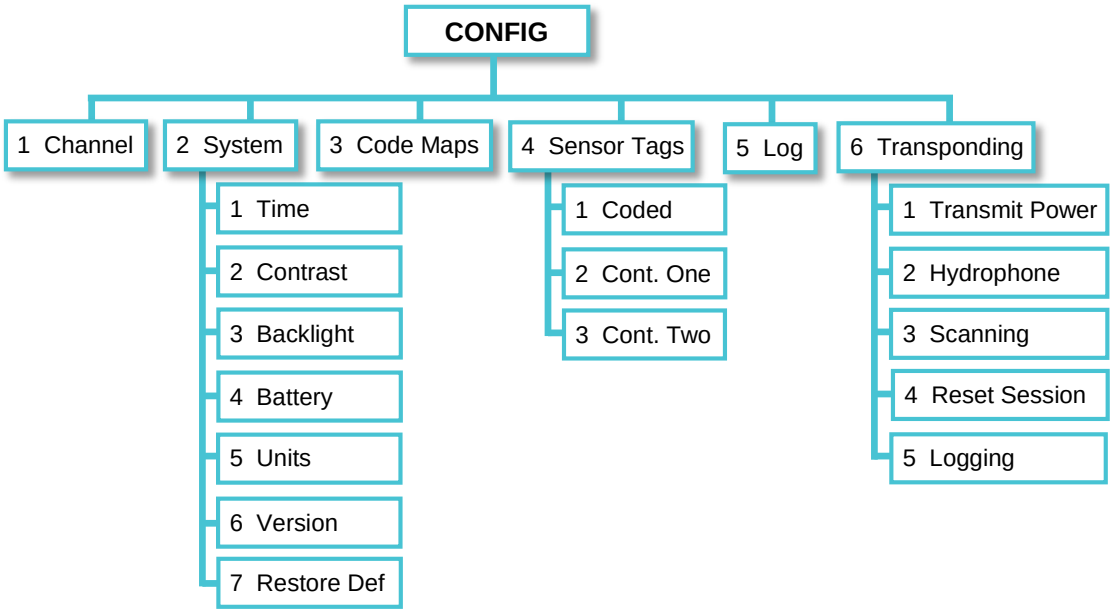
The three menu groups within the VR100 are all accessed from the VR100 Main screen. How these menus are accessed differs slightly when using the VR100-200 model compared to the older VR100 model. Accessing the Monitor features on the VR100 is always accomplished by pressing the left selection button while the VR100 displays the Main screen (shown below). How to monitor tags is described in section 4.2.

On the VR100-200 model, with firmware version 3.3.1 or greater installed, the Transponding menu is accessed by pressing the right selection button as shown in the drawing on the right below. The features of the Transponding menu that are most commonly used in the field are described in section 4.4 with the remaining features being described in section 6.1.3.

VR100-100 Main Screen	VR100-200 Main Screen
	

6.1.2 Configure Menu Structure

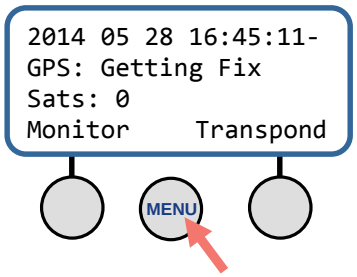
It is in the Configure menu that VR100 settings can be set, such as adjusting the backlight, entering sensor tag information, or setting up a channel. The structure of this menu is shown in the graphic below with explanations following in this section.



1. **Channel** – Setup a channel (see section 2.3) or turn on an existing channel (see section 2.3.5).
2. **System** – setup or lookup VR100 hardware features
   a. Time – select the UTC offset and local time (see section 2.1.2). More about time is found in section 6.7.
   b. Contrast – allows the VR100's screen contrast to be adjusted for better viewing
   c. Backlight – backlight can be set to be on, off, or Smart. The Smart option turns the backlight on for five seconds when a button is pressed on the keypad (see section 2.1.5.1).
   d. Battery – view the status of the battery, including the voltage level (see section 4.3.1).
   e. Units – select the units displayed with sensor data (see section 2.1.3).
   f. Version – The version sub-menu contains information pertaining to this particular receiver, such as the serial number and the firmware version number. This information is only needed if it is requested during your communications with VEMCO.
   g. Restore Def – restore the VR100 to the factory default settings. This removes all sensor tag settings and clears the channel configurations. A confirmation window will appear to verify that this is the desired action before the receiver is reset. This also restores default transponding parameters and resets the transponding session (i.e. clears the list of found receivers). Do not perform other tasks on the VR100 while the settings are being returned to the factory default values (approximately eight seconds).
3. **Coded Maps** – view the codes spaces supported by each coded map. Coded maps and code spaces are discussed in section 7.1. Follow the steps listed in section 7.2.7 to view the ones in the VR100.

4. **Sensor Tags** – enter, edit, or delete the information pertaining to sensor tags (see section 2.2).
    a. Coded – enter, edit, or delete the information pertaining to a coded sensor tag (see section 2.2.1)
    b. Cont One – enter, edit, or delete the information pertaining to a continuous one-sensor tag (see section 2.2.2)
    c. Cont Two – enter, edit, or delete the information pertaining to a coded sensor tag (see section 2.2.2)
5. **Log** – the Event Log screen contains the number of recorded events and the percentage of log memory used. It also contains the option to erase the event log (see section 3.6).
6. **Transponding** – VR100 settings related to transponding, such as transmit power.
    a. Transmit Power – how strong the "talk" signal is when it leaves the VR100-200. What strength this should be is explained in section 6.1.2.2.1.
    b. Hydrophone – information about the transponding hydrophone currently connected to the VR100-200 is displayed on the VR100-200 screen. This information includes the hydrophone's operating mode, model, hardware number, and serial number.
    c. Scanning – View and/or edit the parameters used when scanning for receivers when the "Scan" button is selected (see section 4.4.1). Default values should not need altering unless issues are encountered when trying to establish acoustic communication (see section 6.1.2.2.3).
    d. Reset Session – Clears the existing list of receivers that responded after a scan was performed and restores default parameters (i.e. transmit power, scanning parameters, transponding channel config). This reset will occur automatically after 10 minutes without communication with a receiver.
    e. Logging – Used if there are problems and the raw transponding pings are needed for debugging purposes.

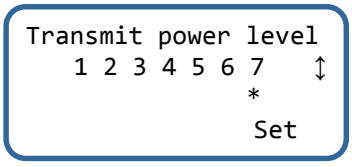
6.1.2.1 Entering Configure menu



Access the Configure menu by selecting the MENU button on the front panel when in the Main screen (shown at the right). The older VR100 (VR100-100) receiver can also enter the Configure menu by pressing the right selection button, under the word "Config". At any other time, the MENU button will return the screen to the previous menu layer.

6.1.2.2 Transponding Settings in the VR100-200

6.1.2.2.1 Power



Press the MENU button and select "Transmit Power" (#6) to view the various power levels at which the VR100-200 can transmit an acoustic signal. The asterisk (*) is shown under the current power setting. To change the power setting, use the arrow buttons to move the asterisk to the desired power level and then press the right selection button to "Set" the value. When the asterisk is beneath the "1" then the text "minimum" will appear in the bottom right corner to indicate this is the minimum power setting and "maximum" appears when the asterisk is beneath the "7".

What power level should you use? That depends on your environment and situation. For example, a high power level can allow for greater range between the transponding hydrophone and the receiver, but given the right situation can cause echo noise that would adversely affect communication. The best power level for your situation depends on your situation. We recommend starting at the highest power level (7) and making changes only as needed.

6.1.2.2.2 Hydrophone

Information about the transponding hydrophone currently connected to the VR100-200 is displayed on the VR100-200 screen. This information includes the hydrophone's operating mode, model, hardware number, and serial number.

6.1.2.2.3 Scanning

The Scanning values should not need to be changed unless there are a large number of receivers in an area and communication issues arise while trying to establish acoustic communication.

When a command is sent to receivers to wake up and respond, the VR100 waits for a period of time to listen for responses from any receivers in the area. This wait time is divided into slots, each slot being approximately 10 seconds. The remote receiver randomly responds in one of the time slots, allowing multiple receivers to be detected with only one search command, but there is still a chance for responses to collide in the same time slot. By default, the minimum number of slots used is two and the maximum is eight. These values can be increased if there are a large number of receivers in the area and issues arise when trying to establish communication.

The maximum number of slots refers to the incrementing aspect of the scanning period. If the VR100 detects that a collision occurred between responding receivers (i.e. more than one receiver responded at the same time, thus causing the pings to overlap and be unidentifiable), the VR100 will increase the number of slots by one the next time it scans. If this issue repeats, the number of time slots the VR100 waits will increment by one until the maximum number of slots is reached.

If the maximum number of slots is reached and the receivers have not responded, another wakeup command is broadcast and the scanning process repeats until the set maximum number of wakeups is reached.

6.1.2.2.4 Reset Session

A transponding session begins when the VR100-200 sends the "Scan" command to any receivers in the area. The transponders that respond are listed in the VR100-200 screen and that list is held until the transponding session is ended. Simply turning the VR100 off will not end a transponding session. To do that, one of the following must occur:

1. Ten minutes of communication inactivity between the VR100-200 and any of the receivers in the list will cause the session to time-out
2. Select "Reset Session" in the Configure menu.
3. Restore factory defaults

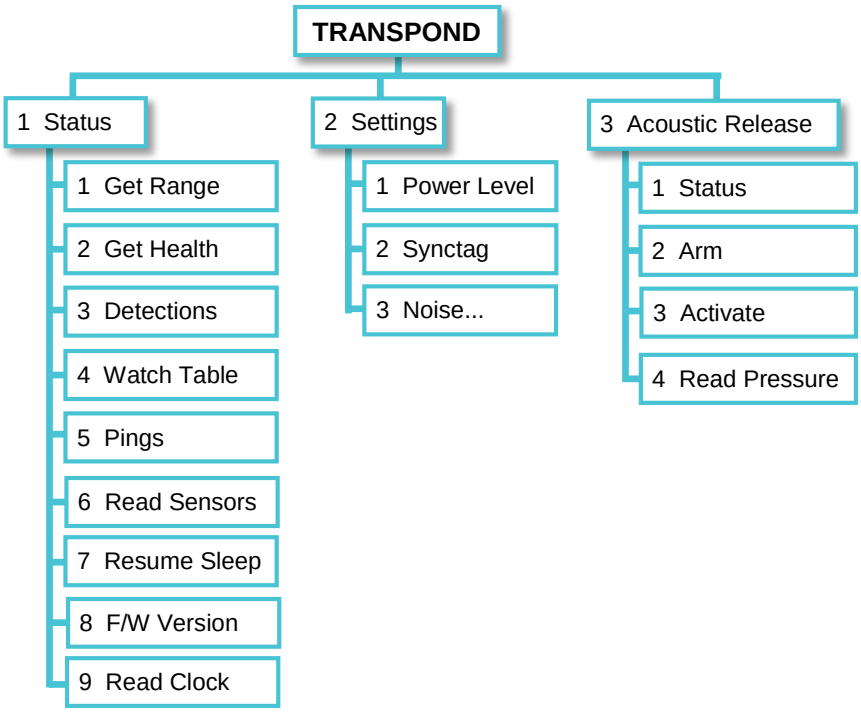
6.1.2.2.5 Logging

This logging feature enables/disables logging of raw transponding pings, mainly for debugging purposes.

6.1.3 Transponding Menu Structure

The menu structure within the Transponding section of the VR100-200 is listed below with a brief explanation of each feature. Common transponding tasks are explained in detail in section 4.4. Additional transponding tasks are discussed in section 6.2.

```
1 Status...
2 Settings...
3 Acoustic Release
                Select
```



1. Status

a. Get Range – reports absolute range (m), horizontal range (m), depth (m), and pressure (psi). Pressure is not available on the VR2Tx. See section 4.4.2.

b. Get Health – reports absolute range, estimate battery remaining, memory used, tilt (see section 4.4.2.).

c. Detections… – reports an approximate number of detections stored in receiver (see section 4.4.3)

   i. Total Detects – displays the number of detections stored in the receiver since it was last initialized and the memory was erased. Initialization can only occur while the receiver is communicating with VUE software.

   ii. Since Offload – reports the number of detections stored in the receiver since the last data offload to VUE.

   iii. Since Marking – reports the number of detections stored since the last mark was left in the receiver memory.

   iv. Mark All – leaves an electronic "mark" in the internal memory and is used with "Since Marking". This also clears the Watch Table detections.

d. Watch Table… – this table is setup using VUE and used to view the number of detections from an individual tag that are stored in this receiver. The watch table numbers and the corresponding tag ID codes can be exported from VUE as a .csv file.

e. Pings… – displays the number of pings detected; useful when trouble shooting in a noisy environment.

i. Total Pings – displays the number of pings stored in the receiver since it was last initialized and the memory was erased. Initialization can only occur while the receiver is communicating with VUE software.

ii. Since Offload – reports the number of pings stored in the receiver since the last data offload to VUE.

iii. Since Marking – reports the number of pings stored since the last mark was left in the receiver memory.

iv. Mark All – leaves an electronic "mark" in the internal memory and is used with "Since Marking". This also clears the Watch Table detections.

f. Read Sensors – reports the receiver's absolute (or slant) range, the temperature, the depth (VR2AR only), the vertical tilt on the unit, and the horizontal range (VR2AR only).

g. Resume Sleep – ends communication session with this receiver. Receiver won't communicate again for a full ten minutes.

h. F/W Version – shows the absolute range and the firmware version.

i. Read Clock – Reports the current clock time of the receiver, allowing you to verify it is correct

2. Settings

a. Power Level… – refers to the transmit power of the remote receiver unit (VR2Tx or VR2AR) back to the VR100 at the surface (see section 6.2.1).

i. Read power level – reports the current power setting

ii. Set power level – allows you to change the power setting. Maximum power level 4 ("very high") is recommended for the majority of communication situations. Reducing the power level may be desired if the receiver is within close range of the transponding hydrophone.

b. Synctag – Allows you to read and set up the sync tag power and transmit mode.

i. Read Synctag – reports the current power and profile setup for tag transmissions from the receiver.

ii. Setup Synctag… – select the transmit power level from 1 (low) to 4 (very high), and the tag profile of the tag transmissions from the receiver. The available tag profiles are:

1. Don't Change
2. Synctag (transmits randomly between 540 to 660 seconds; nominal is 600 seconds, or 10 minutes)
3. Random90s (transmits randomly between 60 to 120 seconds; nominal is 90 seconds)
4. Fixed90s (transmits at a fixed rate of 90 seconds)
5. Off (does not transmit an ID code)

c. Noise… – displays ambient noise in the area, which may be helpful in deciding if a deployment location is too noisy for reliable tag detections

i. Setup & Start… – setup a sample rate (in seconds) and the number of samples to be taken.

ii. Stop & Read – retrieve the minimum, maximum, and average noise readings taken.

3. Acoustic Release (VR2AR only – see section 4.4.5)

a. Status – reports the status of the acoustic release in a VR2AR receiver

b. Arm – alerts VR2AR that an activation command is likely to follow; acts as a safety feature against accidently releasing the unit.

c. Activate – sends the release command to the VR2AR, causing the mooring lug to be released. Activate is only available after VR2AR status is "armed" and it requires a 5-digit PIN code.

d. Read Pressure – read the pressure the VR2AR is experiencing in Bars, PSI, and meters.

6.1.4 VR100HS (software) Menu Structure

The menu structure of the VR100HS is listed below. The tasks performed with this software are explained in section 3 – Software.

From within theVR100 Receiver window:

A. File
   a. Open
   b. Save As…
   c. Export
   d. Exit

B. Logs
   a. Get All Data
   b. Get Recent Data
   c. Erase VR100 Log

C. Settings
   a. Tag Manager
      I. File
         1. New
         2. Open
         3. Save
         4. Save As…
         5. Exit
      II. PC Setup
         1. Add
            i. Add Tag
         2. Import
      III. Receiver Setup
         1. Refresh
   b. Options

D. Help
   a. Documentation
   b. Support…
   c. About VR100…

6.2 Additional Transponding Commands

The common transponding commands used to communicate with a receiver in the field are explained in section 4.4. The remaining commands, which are explained in this section of the manual, are less commonly used.

6.2.1 Reading/Changing Receiver Power Level

The power level at which a receiver transmits to the VR100-200 during acoustic communication can be read and changed while the receiver is deployed. After establishing acoustic communication between the receiver and the VR100-200 (see section 4.4.1), follow the steps listed below. This does not affect the transmit power level of the receiver's sync tag.

If the transmit power level needs to be adjusted, adjust the transmit power level of the VR100-200 (see section 6.1.2.2.1) ***before*** adjusting the transmit power level of the receiver.

STEP 1

Select "Settings…" (#2) from the main transponding menu.

```
1 Status...
2 Settings...
3 Acoustic Release
                Select
```

STEP 2

Select "Power Level" (#1).

STEP 3

Select "Read Power Level" (#1) to view the current power level setting, or select "Set Power Levels" (#2) to change the current power level. If you select #2, continue to Step 4.

```
1 Read Power Level
2 Set Power Level

              Select
```

STEP 4

Use the arrow buttons to move the asterisk until it sits beneath the desired power level. The larger the number, the higher the transmit power. Usually, higher power levels means more reliable acoustic communication, but high power can cause noise problems (such as echoes) in the area that actually reduce communication.

```
Transmit power level
    1  2  3  4
          *
            Set
```

Press the right selection button to "Set" the power level as the new level.

Press the MENU button to return to the Acoustic Release menu.

Use caution when reducing the transmit power level in the receiver. If the power level is too low, the VR100-200 may not detect the receiver.

6.2.2 Setting Up Sync Tag

Receivers have the ability to transmit a pre-programmed coded ID. How this transmission is formatted can be selected by following the steps listed below. The Coded ID that is transmitted was programmed into the receiver at the time of manufacture and cannot be changed.

STEP 1

Select "Settings…" (#2) from the main transponding menu.

```
1 Status...
2 Settings...
3 Acoustic Release
                Select
```

STEP 2

Select "Synctag…" (#2).

```
1 Power Level
2 Synctag...
3 Noise...
                Select
```

STEP 3

Select "Read Synctag" (#1) to view the current power level and setting of the sync tag, or select "Setup Synctag" (#2) to change the current power level and settings.

```
1 Read Synctag
2 Setup Synctag

                Select
```

If you select to read the current synctag power level and profile settings (#1), the VR100-200 will request the information from the receiver and display It on the screen similar to the one shown at right.

```
VR2AR:000001 150m
Power: VeryHigh
Profile: Fixed90s
(SYNCTAG)      Resend
```

If you select to change the power level or setup of the sync tag (#2), continue to Step 4.

STEP 4

TIP: Select the desired number on the keypad instead of using the arrow buttons.

Use the arrow buttons to move the cursor until it covers the desired power level. The larger the number, the higher the transmit power level of the coded ID. Descriptions are shown based on which level is highlighted by the cursor.

```
Synctag Power Level
  1   2   3   4    ↕
      (High)
                Next
```

Press the right selection button to select the highlighted power level as the new level and to move to the next screen in the setup process.

STEP 5

Use the arrow buttons to move the cursor until it covers the desired timing profile. The profile names are shown based on which profile is highlighted by the cursor. Descriptions of the profiles are listed below.

```
Pick Timing Profile
  1  2  3  4  5   ↕
    (Random90s)
                Next
```

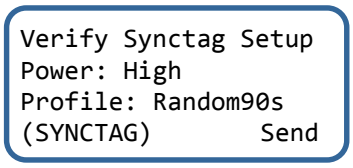
1. Don't Change – settings will remain as they are
2. Synctag – ID transmits randomly between 540 to 660 seconds; nominal is 600 seconds, or 10 minutes)
3. Random90s – transmits randomly between 60 to 120 seconds; nominal is 90 seconds
4. Fixed90s – ID transmits at a fixed rate of 90 seconds
5. Off – no ID code is transmitted

TIP: Select the desired number on the keypad instead of using the arrow buttons.

Press the right selection button to select the highlighted timing profile as the new level and to move to the next screen in the setup process.

STEP 6

Verify that the power level and profile are both as desired. Select "Send" to send the new settings to the receiver, or "cancel" to return without making changes.



STEP 7

Use the MENU button to return to the main transponding screen.

6.2.3 Learning Noise Levels

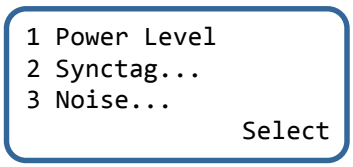
Receivers can report the amount of ambient noise in the area, which may be helpful in deciding if a deployment location is too noisy for reliable tag detections. To get the noise levels in the area, the receiver must first be setup to record the noise levels.

STEP 1

Select "Settings…" (#2) from the main transponding menu.

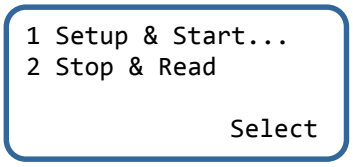
STEP 2

Select "Noise…" (#3).



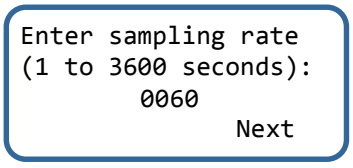
STEP 3

Select "Setup & Start" (#1) to begin the noise reporting process.



STEP 4

Enter the desired time, in seconds, between noise measurements. This can be any number between 1 and 3600 seconds (1 hour) but for times over 59 seconds, the resolution becomes one minute. For example, entering 90 means a sample will be taken every two minutes, as is shown in the confirmation window of Step 6.

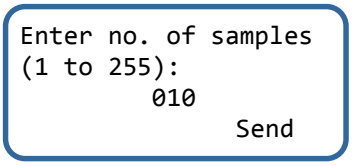


STEP 5

Enter the number of samples that are to be taken, between 1 and 255.

For example, if the sampling rate is 60 seconds and the number of samples is set at ten (10), then the noise results will apply to a ten minute period of time.

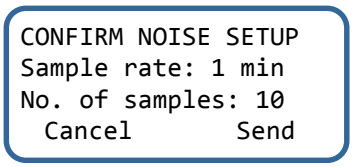
Select "Send" to continue. The settings are not sent yet.

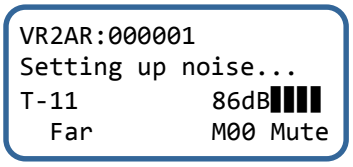


Continued…

STEP 6

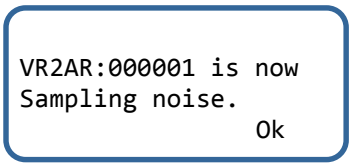
Confirm the settings as shown in the VR100 screen. If they are correct, then select “Send” to send these settings to the receiver.





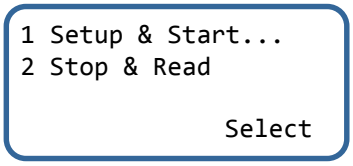
STEP 7

Wait the selected amount of time while noise samples are taken.
For the example above, that would be ten minutes.



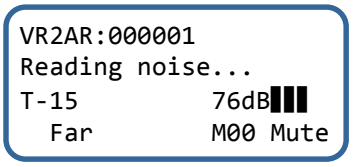
STEP 8

Press “Menu” to return to the Noise menu list. Select “Stop & Read” (#2) to stop recording the noise values and retrieve the information.



STEP 9

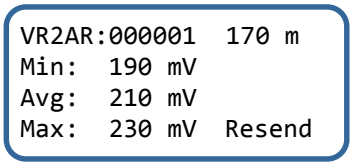
Wait while the VR100 retrieves the noise information from the receiver.



STEP 10

The minimum noise level (in mV), the average noise level (in mV), and the maximum noise level (in mV) are all listed in the order.

Press resend to repeat the retrieval process, if desired.



STEP 11

Use the MENU button to return to the main transponding screen.

6.3 Battery

When the internal gel-cell battery is fully charged, it will power the VR100 receiver for approximately 12 hours with the backlight off and under normal operating conditions. Operating time with the backlight on is shorter. The VR100 can also be powered while the battery is being charged, allowing the receiver to continue to operate during the charging process.

The steps taken to charge the battery are listed in section 5.2.

The VR100 receiver is equipped with internal sensors that determine its position and internal temperature. These sensors prevent the charging process if the receiver is positioned at a steep angle or upside down, or if the internal temperature of the receiver is excessive. If the VR100 is tilted, the STATUS and LOW BATT lights (also called LEDs) on the front panel will both flash and charging will not occur. To charge the battery when both lights are flashing, unplug the VR100 charger and reposition the VR100 with the front panel facing up before plugging the charger back into the power supply (see section 6.3.1). If the internal temperature exceeds a safe limit, battery charging will be disabled until the receiver has cooled, then it will automatically resume.

The VR100 battery charges in two stages: Fast and Float. The Fast Charge mode quickly charges the battery most of the way, and the Float Charge mode slowly charges it the rest of the way. The battery can be left in Float Charge mode for an extended period without damaging the battery. When the "STATUS" light is on steady, the unit is in Fast Charge mode. When the light begins flashing, the unit is mostly charged and is in Float Charge mode. The unit can be used as soon as it enters Float Charge mode, but it will not necessarily last the entire 12 hour battery life. To achieve the 12 hour battery life, the unit should be charged for 14 hours or more at room temperature. At high ambient temperatures, charging may take longer because the VR100 turns the charger off and on to control the internal temperature.

A fully charged battery can last up to 12 hours with the backlight off.

AC Battery Charger

The VR100 battery fully charges in 14 hours at room temperature.

DC Battery Charger

The VR100 battery can be left in Float Charge mode for an extended period of time without causing damage to the battery, but ***the receiver's front panel must be facing up***. A sensor is included in the VR100 that prevents the receiver from being charged while the receiver is at a steep angle or upside down.

Fully charge the VR100 battery after every use and before storage. ***Ensure the battery is charged every three to four months during storage***. If not, the battery can become fully depleted and permanently damaged.

6.3.1 Charge Indicator Lights

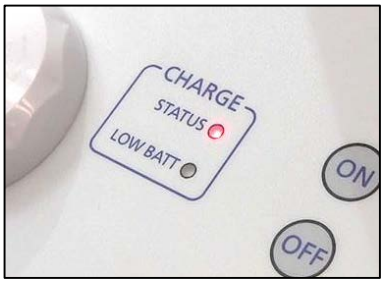
The “Charge” indicator lights (also called LED – “Light Emitting Diode”) on the VR100’s front panel are the “STATUS” light and the “LOW BATT” light. These lights are to the left of the ON and OFF buttons (see photo below). The meaning of these lights is explained in the table below.

STATUS light	LOW BATT light	Description
Flashing	Off	Battery is mostly charged and is in Float Charge mode
On Steady	Off	Battery is charging.
Off	Flashing	Battery is nearing discharge.
Off	On Steady	Battery is discharged and the VR100 is about to shut shown. External power is required.
Flashing	Flashing	Tilt or Power System Fault has occurred – see paragraph below.

NOTE: The battery can be left in Float Charge mode for an extended period without damaging the battery.

If a Tilt or Power System Fault occurs (both lights are flashing), follow the steps below to clear the fault and resume normal battery charging operation.

1. Ensure that the front panel of the VR100 is facing up.
2. Ensure that a proper power supply is connected to the VR100. If the voltage is too high or too low, a Power System Fault results.
3. Place the VR100 away from direct sources of heat (including direct sunlight) and allow it to cool.
4. Unplug the external power supply and wait for the lights to stop flashing.



When these conditions have been met, plug the external power supply into the VR100 again. If both lights continue to flash, unplug everything from the VR100 case (power supply, hydrophone, USB cable, and headphones) and call VEMCO support at +1-902-450-1700 or email to support.team@vemco.com.

The VR100 can be safely used in a vertical position (front panel is perpendicular to the floor) with an external power source connected but the battery WILL NOT CHARGE under this condition. The “STATUS” and “LOW BATT” lights will both flash as long as the unit is vertical and an external power source is connected. In this situation, the unit is being powered from the external supply, and thus can be used indefinitely, regardless of the level of battery charge.

6.3.2 Maximizing Battery Service Life

The VR100 is powered by a rechargeable lead-acid gel battery. It is normal for the performance of all rechargeable batteries to diminish gradually over time and with use, but with proper care the VR100 battery should provide a useful service life of several years.

The conditions that cause the most severe degradation of a battery are over-discharging it, and extreme temperatures (whether operating or not). To protect against these, the VR100 will automatically shut itself off if the battery is run down, and it manages its internal temperature by shutting down first the battery charger then the entire receiver if necessary to keep the temperature below an acceptable limit.

To maximize the service life of your VR100 battery, follow these recommendations as much as possible:

- Keep the battery fully charged and avoid completely discharging it. When you see the Low Battery warning indicated on the LEDs, connect the charger. After each time you use the VR100, recharge the battery even if it is not fully depleted. A series of partial discharges is gentler on the battery than a deep discharge.
- If the VR100 shuts itself down due to a fully discharged battery, do not turn it back on until you have connected the charger.
- Store, charge, and operate the VR100 between 15 C and 25 C if possible. Storing the VR100 long term at 35 C will actually reduce the battery's service life by a factor of about ½.
- Store the VR100 under clean, dry, non-condensing conditions.

Never completely discharge battery

Fully charge the VR100 battery after every use and before storage. ***Ensure the battery is charged every three to four months during storage***. If not, the battery can become fully depleted and permanently damaged.

6.4 Monitor Screen Explanations

These are more detailed explanations of the Monitor screen, a sample of which can be seen in section 4.2.1.

Coded ping train identification

This indicates which part of a coded ping train is being received. When the first interval, or sync, of a coded ping train is identified, which requires two pings, an "S" is displayed in the centre of the Monitor's top line. With each additional ping, a number is added to the S to indicate how many pings were received in addition to the sync. When the ping train is complete, the information in the second and third lines and the time elapsed since the last detection are displayed.

Time of last detection

The time, in hours, minutes, and seconds, of the last detection.

Signal strength

The relative strength of the received signal, between 0 and 105 dB. The value is visually represented on the bar graph to the right of the numeric value. The signal strength is cleared if a signal hasn't been received for more than 10 seconds.

IMPORTANT: The signal strength reading is a relative measure of the voltage level present at the receiver input (0dB = minimum measureable voltage, 105dB = full scale voltage). It is strictly a relative measure of signal strength and cannot be used to measure the output power of a transmitter in terms of dB re 1uPa @ 1m.

Mute Audio

The audio heard from either the speaker or headphones is muted by pressing the right selection button below the word “Mute” in the Monitor screen.. When the Mute button is pressed, the audio is muted and the word “Mute” briefly becomes “VOL00” to indicate that the volume is zero. The volume is restored at the same level by pressing the Mute button again. The volume can be restored at a level above or below the muted volume level by pressing the volume buttons on the front panel (see section 1.4.2).

When the volume level is changed, the “Mute” will change to “VOLXX” for a moment to indicate the volume level. The XX in “VOLXX” is a numeric representation of the volume level.

Gain level

The number shown indicates the amount of gain the receiver is using, in decibels (dB). The gain can be manually increased or decreased using the Gain buttons on the front panel (see section 1.4.2). The gain moves in steps of 6 dB (decibels) and can be changed either manually or automatically. An “M” next to the gain number indicates the gain is in manual mode while an “A” indicates it’s in automatic mode (AGC – Automatic Gain Control). The mode is toggled between automatic and manual by pressing the AGC button on the front panel of the receiver (see section 1.4.2).

NOTE: Since the VR100 receiver has a wide dynamic range, the gain setting is not critical in most situations. A good setting for general use is to set the gain manually to 12 dB. If the reported signal strength is consistently greater than 90 dB, reduce the manual gain setting. When working at extended ranges or if the reported signal strength is consistently weak, increase manual gain setting. In some adverse situations where the manual gain control does not provide adequate results, try using the AGC mode

Channel number

The number next to the “CH” indicates the channel number being monitored. Press the number on the keypad that corresponds with the channel number to monitor that channel.

Detection Parameter

The detection parameter determines what is identified as a received ping and what is considered background noise (see section 6.9). The three detection parameter settings available are listed below. A more detailed explanation is found in section 6.9.

Parameter Name	Detection Level	When to Use It
Near	Background noise is almost never mistaken as a real ping (called a false detect), but some real pings may be mistaken as background noise and blocked.	Use when the VR100 is receiving too many echo signals on the Norm setting, such as when the tags are in an enclosed area like a tank.
Norm	Not as aggressive as Near and not as liberal as Far. Most real pings will be detected but some background noise may be mistaken as real pings.	Use this level for almost all applications.
Far	Nothing is blocked. This allows almost all real pings to be received but background noise will be mistaken as real pings.	Use when the tags are far from the hydrophone or the signal is weak. This could increase the range.

Transmitter ID and Data

Transmitter data is displayed as shown in the table below. The sensor data received from a sensor transmitter is displayed in the applicable units. The units shown on the Transmitter Type line are configurable, as explained in section 2.1.3. Continuous sensor transmitters must be set up in the receiver before they can be monitored (see section 2.2 or 3.8.1). Data received from a coded sensor transmitter that has not been set up in the receiver will be displayed as raw data.

Transmitter Type	Sample	Comments
Continuous pinger	P 1000 ms	"P" indicates the detection is from a continuous pinger. The period is given in milliseconds (ms).
Continuous 1 sensor	S1 6.3°C	"S1" indicates the data is from a one-sensor continuous transmitter. The data is shown in the applicable units.
Continuous 2 sensor	S2 6.3°C 49.5m	"S2" indicates the data is from a two-sensor continuous transmitter. The data is shown in the applicable units.
Coded pinger	# 57452	"#" indicates that the coded pinger ID number follows.
Coded sensor (with units)	# 58 27.3m	The coded sensor ID number is given followed by the data with applicable units.
Coded sensor (without units)	# 8367 RAW=148	The coded sensor ID number is given followed by the raw sensor data.
Undefined coded tag	Undefined Tag	Indicates a coded ping train was received that could not be decoded.

Frequency / Code Space

For coded tags, the code space is displayed (see section 7.1.2 for an explanation of code space). For continuous pinger and continuous sensor tags the frequency being monitored on this channel is shown in kilohertz (kHz). Instructions on setting the channel frequency are given in section 2.3.

Last detection elapsed time

The length of time elapsed (in seconds) since the last detection ("LT" stands for "Last Time"). If the time has been very long, the display will show 999 to indicate there haven't been recent detections.

6.5 Front Panel Explanations

The explanations given below correspond with the photo of the VR100 face plate found in section 1.4.2.

Audio speaker

The speaker allows the pings received from acoustic tags **on the active channel** to be heard when the VR100 is in Monitor mode (see section 4.2); when the VR100 is not in monitor mode, the audio is muted. The sound can be muted within the Monitor screen (see section 4.2.1) and can be adjusted with the volume buttons.

Detection indicators

A detection indicator flashes a green light each time a ping is detected by the receiver. Each detection indicator is numbered and corresponds to a receiver channel (see section 2.3). When a ping is received on a channel, the corresponding detection indicator light will flash. For example, if indicator 2 flashes then we know that channel 2 received a ping.

NOTE: More than one detection indicator can flash at the same time if more than one channel is active (turned on) and pings are simultaneously received on those channels. For example, if channels 1 through 3 are set up for different continuous tag types on 60 kHz then all three detection indicators will flash when a ping is received on 60 kHz.

If "Tx" light flashes red while green lights are flashing, the VR100 is sending, or transmitting, pings to a receiver during acoustic communication.

LCD screen and three related buttons

The LCD screen is used to monitor tags and to configure the VR100. The use of the screen and the three buttons immediately below it is explained in section 1.4.3.

Up/Down buttons

The up and down buttons are used to move a cursor through a list displayed on the LCD screen (see section 1.4.3).

Volume control

The volume control will increase or decrease the volume of the audio signal heard from either the speaker or the headphones. The button marked with a plus symbol (+) increases the volume and the button with the negative symbol (-) decreases the volume. The buttons can be held down or pressed repeatedly for a larger change in volume. The Monitor screen (see section 4.2.1) displays the volume level as "VOLXX" where the XX represents a numeric volume level.

Gain Control

The gain control buttons will increase or decrease the gain level in steps of six decibels (6 dB). The button marked with a plus symbol (+) increases the gain by 6 dB and the button with the negative symbol (-) decreases the gain by 6 dB.

LOG GPS button

The LOG GPS button is used for manual GPS recordings. If the GPS is locked at the time the LOG GPS button is pressed, then the position will be recorded within 1 second. If GPS is not locked, then a reading will not be stored and warning will appear on the screen to indicate GPS is not locked.

AGC button

The AGC (Automatic Gain Control) button toggles the gain level between automatic (AGC) and manual. Use of the button is explained in section 4.2.1. AGC is explained in the Glossary (section 9.5).

Numeric keypad

The numeric keypad is used to enter numbers while configuring the receiver or to select specific channels while monitoring tags.

Power buttons

The power buttons turn on and off the VR100 receiver. The ON button will turn the VR100 on and display the welcome screens while the receiver is booting up. The OFF button will begin the VR100's shut-down procedure.

Battery charge indicators

The battery charge indicators show the status of the battery charging process and indicate when the battery charge is low. More details about charging the battery are found in section 5.2.

GPS antenna

The GPS antenna is contained inside the plastic "puck" for protection and attached to the front panel. The GPS antenna is able to receive the GPS signals when the VR100 is outdoors, even with the case lid closed. More information about the GPS is located in section 6.8.

6.6 File Types

There are four types of files associated with the VR100: log, csv, resource, and raw files. A log file contains the data offloaded from a VR100 and can only be viewed in the VR100HS software. Comma Separated Variable (CSV) files can be opened in a spreadsheet package that is CSV compatible. Resource files contain tag setup information and can be used to move tag setups to other computers and VR100 receivers. Raw files are used by VEMCO for diagnostic purposes and cannot be viewed by the user.

6.6.1 Log files

Log files are saved when data is offloaded from a VR100 (see section **Error! Reference source not found.**). The *Open* command in the *VR100 Receiver* window allows a log file to be opened and viewed in the *VR100 Receiver* window. A log file can be opened within any *VR100 Receiver* window, including the Virtual *VR100 Receiver* window, but can only be viewed in the VR100 software. The log file has been specifically designed so it can only be opened in the VR100 software.

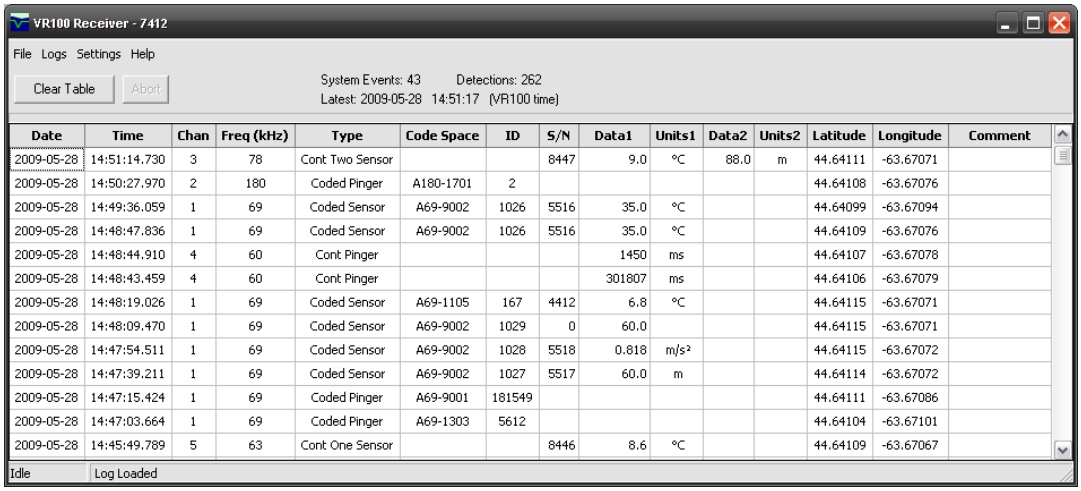
The log files are usually saved using a standard file naming system and with the extension .zlog but a unique name can be assigned when the file is saved. A sample of the standard file name is shown below. The serial number in the file name is the serial number of the receiver the data was loaded from, and the date and time are when the log file was created on your computer.

VR100_007493_D2005.01.20T14.09.42.zlog

Serial Number | Date | Time

The data displayed in the log file contains the following information for tag detections: date, local time, channel, frequency (in kHz), tag type, code space (if coded), ID (if coded), serial number (sensor tags only), data (see section 6.6.1.1), latitude, and longitude. The signal strength and receiver gain levels can be viewed by "hovering" the mouse arrow over the cell in the Channel column. Likewise, the slope(s) and intercept(s) can been viewed by "hovering" the mouse over Data1 or Data2. Comments can be typed in the Comments column of the log file to be saved in the Comma Separated Variable file (see section 6.6.2).

Manual GPS readings are identified in the Type column of the log file as "GPS" and columns that don't relate, such as frequency and data, are blank.



Date	Time	Chan	Freq (kHz)	Type	Code Space	ID	S/N	Data1	Units1	Data2	Units2	Latitude	Longitude	Comment
2009-05-28	14:51:14.730	3	78	Cont Two Sensor			8447	9.0	°C	88.0	m	44.64111	-63.67071	
2009-05-28	14:50:27.970	2	180	Coded Pinger	A180-1701	2						44.64108	-63.67076	
2009-05-28	14:49:36.059	1	69	Coded Sensor	A69-9002	1026	5516	35.0	°C			44.64099	-63.67094	
2009-05-28	14:48:47.836	1	69	Coded Sensor	A69-9002	1026	5516	35.0	°C			44.64109	-63.67076	
2009-05-28	14:48:44.910	4	60	Cont Pinger				1450	ms			44.64107	-63.67078	
2009-05-28	14:48:43.459	4	60	Cont Pinger				301807	ms			44.64106	-63.67079	
2009-05-28	14:48:19.026	1	69	Coded Sensor	A69-1105	167	4412	6.8	°C			44.64115	-63.67071	
2009-05-28	14:48:09.470	1	69	Coded Sensor	A69-9002	1029	0	60.0				44.64115	-63.67071	
2009-05-28	14:47:54.511	1	69	Coded Sensor	A69-9002	1028	5518	0.818	m/s²			44.64115	-63.67072	
2009-05-28	14:47:39.211	1	69	Coded Sensor	A69-9002	1027	5517	60.0	m			44.64114	-63.67072	
2009-05-28	14:47:15.424	1	69	Coded Pinger	A69-9001	181549						44.64111	-63.67086	
2009-05-28	14:47:03.664	1	69	Coded Pinger	A69-1303	5612						44.64104	-63.67101	
2009-05-28	14:45:49.789	5	63	Cont One Sensor			8446	8.6	°C			44.64109	-63.67067	

Log files can be converted to Comma Separated Variable (.csv) files using the *Export* command in the *VR100 Receiver* window (see section 6.6.2.2).

6.6.1.1 Data in Log files

The sensor data is listed in either the "Data1" column or the "Data2" column of the log file. If there is only one sensor in the sensor transmitter then data is only shown in the "Data1" column. The unit for the data is given in the adjoining "Units" column. The slope and intercept associated with this data can be viewed by "hovering" the mouse arrow over the Data column. The slope and intercept will appear for a few seconds in a small view box. Continuous pingers without a sensor will display the period in the "Data1" column with the units listed as "ms" (milliseconds).

6.6.1.2 View a log file

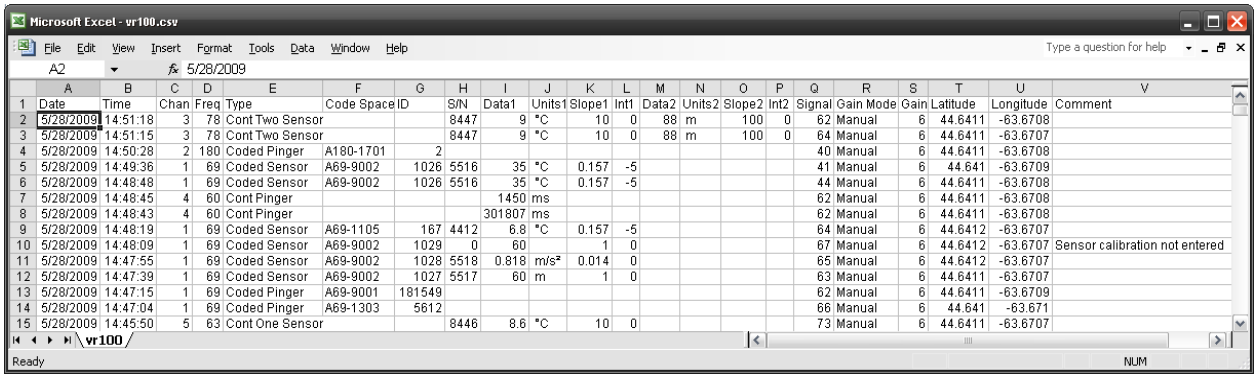
Log files contain data received by the VR100 receiver (see section 6.6.1 for more information). Log files can not be edited but can be viewed by following the steps listed below.

1. Open a *VR100 Receiver* window. It doesn't matter which receiver is selected, including the Virtual receiver.
2. Select "Open" in the *File* menu of the *VR100 Receiver* window (see section 3.3).
3. Select the log file from the list shown in the Open window.

The log file is displayed in the *VR100 Receiver* window, as shown in section 6.6.1. Comments added to the "comments" column of the file are saved when the log file is saved as a comma delimited file (see section 6.6.2). No changes can be made to the log file in .zlog format.

6.6.2 Comma Separated Variable files

A Comma Separated Variable (CSV) file is a data file in which the variables are separated by commas. This allows the file to be opened in a spreadsheet package that is CSV compatible, such as Excel or Quattro Pro. These files are created using the *Export* command (see section 3.7).



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Date	Time	Chan	Freq	Type	Code Space	ID	S/N	Data1	Units1	Slope1	Int1	Data2	Units2	Slope2	Int2	Signal	Gain Mode	Gain	Latitude	Longitude	Comment
2	5/28/2009	14:51:18	3	78	Cont Two Sensor			8447	9	°C	10	0	88	m	100	0	62	Manual	6	44.6411	-63.6708	
3	5/28/2009	14:51:15	3	78	Cont Two Sensor			8447	9	°C	10	0	88	m	100	0	64	Manual	6	44.6411	-63.6707	
4	5/28/2009	14:50:28	2	180	Coded Pinger	A180-1701	2										40	Manual	6	44.6411	-63.6708	
5	5/28/2009	14:49:36	1	69	Coded Sensor	A69-9002	1026	5516	35	°C	0.157	-5					41	Manual	6	44.641	-63.6709	
6	5/28/2009	14:48:48	1	69	Coded Sensor	A69-9002	1026	5516	35	°C	0.157	-5					44	Manual	6	44.6411	-63.6708	
7	5/28/2009	14:48:45	4	60	Cont Pinger				1450	ms							62	Manual	6	44.6411	-63.6708	
8	5/28/2009	14:48:43	4	60	Cont Pinger				301807	ms							62	Manual	6	44.6411	-63.6708	
9	5/28/2009	14:48:19	1	69	Coded Sensor	A69-1105	167	4412	6.8	°C	0.157	-5					64	Manual	6	44.6412	-63.6707	
10	5/28/2009	14:48:09	1	69	Coded Sensor	A69-9002	1029	0	60		1	0					67	Manual	6	44.6412	-63.6707	Sensor calibration not entered
11	5/28/2009	14:47:55	1	69	Coded Sensor	A69-9002	1028	5518	0.818	m/s²	0.014	0					65	Manual	6	44.6412	-63.6707	
12	5/28/2009	14:47:39	1	69	Coded Sensor	A69-9002	1027	5517	60	m	1	0					63	Manual	6	44.6411	-63.6707	
13	5/28/2009	14:47:15	1	69	Coded Pinger	A69-9001	181549										62	Manual	6	44.6411	-63.6709	
14	5/28/2009	14:47:04	1	69	Coded Pinger	A69-1303	5612										66	Manual	6	44.641	-63.671	
15	5/28/2009	14:45:50	5	63	Cont One Sensor			8446	8.6	°C	10	0					73	Manual	6	44.6411	-63.6707	

NOTE: Detection times are output to the CSV file with three extra digits of precision. These values are correctly read by Excel, however the default display formatting (mm:ss.0) is incorrect. Change the formatting to "hh:mm:ss.000" to properly display these times.

6.6.2.1 Create a comma delimited file from data

Create a comma delimited file from data by following the steps below.

1. Open the *VR100 Receiver* window (see section 3.3) for the receiver containing the data.
2. Select *Get All Data* (see section 3.4.1) or *Get Recent Data* (see section 3.4.2), depending on how much data you want. The data will load to the computer in less than four minutes.
3. Select *Export* in the *File* menu (see section 3.7).
4. Enter the desired file name in the "File name" box of the *Export Current Log* window and click "Save". The comma delimited file is created and located in the directory selected.
5. Once receiver log data has been saved, you may erase the data from the receiver (see section 3.6).

The comma delimited file, or Comma Separated Variables file (see section 6.6.2), is now ready to be opened using a .csv supporting spreadsheet program of your choice. Examples of spreadsheet programs that will support a .csv file are Excel and Quattro Pro.

6.6.2.2 Create a comma delimitated file from a log file

Create a comma delimited file from a log file by following the steps below.

1. Open a *VR100 Receiver* window (see section 3.3). This can be any receiver window, including the Virtual receiver.
2. Open the desired log file (see section 6.6.1.2).
3. Select *Export* in the *File* menu (see section 3.7).
4. Enter the desired file name in the "File name" box of the *Export Current Log* window and click "Save". The comma delimited file is created and located in the directory selected.

The comma delimited file, or Comma Separated Variables file (see section 6.6.2), is now ready to be opened using a .csv supporting spreadsheet program of your choice. Examples of spreadsheet programs that will support a .csv file are Excel and Quattro Pro.

6.6.2.3 View a comma delimited file

Comma Separated Variable files (.csv), also known as Comma Delimited Files, can be viewed using any spreadsheet program that supports .csv files. For example, Microsoft Excel and Corel Quattro Pro are both programs that support .csv files.

6.6.3 Resource files

Resource files, which have the extension .xres, contain the setup information for the sensor transmitters that have been entered in the software. These files must be manually saved (see section 3.8.4) as they aren't automatically created by the software. Resource files are extremely beneficial because they eliminate the need to manually re-enter the sensor transmitter information. This saves time and allows the information to be loaded to other VR100 receivers very quickly and easily.

6.6.3.1 Open a Resource file

Open a resource file (see section 6.6.3) to retrieve sensor tag setups. A resource file is opened by following the steps below while in the *VR100 Receiver* window.

1. Select *Tag Manager* in the *Settings* menu of the *VR100 Receiver* window (see section 3.3).
2. Select *Open* in the *File* menu of the *Tag Manager* window (see section 3.8).
3. Select the desired file in the *Open* window. It may be necessary to move to a different directory, depending on where the resource file was saved.
4. Click the "Open" button or double click the file name.

When a resource file is open, the sensor tag setups contained in that file are shown in the *PC Managed Setup* half (left side) of the *Tag Manager* window.

6.6.4 Raw Files

RAW files are automatically saved in the Raw Data Directory (see section 3.9) when data is loaded from the VR100 receiver. These files, named VRDxxx.zraw where each x represents an integer, are not user-readable and are solely used by VEMCO for diagnostic or data recovery purposes. The raw files can be deleted without affecting the operation of the VR100 if disk space is required on the computer but deletion is not necessary. It's suggested that the files are not erased until after data has been successfully recorded.

6.7 Time

The date and time are displayed on the VR100's screen in the format YYYY MM DD HH:MM:SS. Both the date and time can be manually set to any moment on any day, but as soon as the GPS locks the date and time will be corrected to the local time based on the Coordinated Universal Time (UTC) and the offset entered in the VR100 by the user.

The GPS system uses Coordinated Universal Time (UTC), the international time standard (see Glossary for more information). The VR100 receiver will convert the UTC time to the local time as long as the correct offset has been entered in the receiver (see steps listed below). The offset is the number of hours behind (a negative value) or ahead (a positive value) of the UTC your local time zone is. For example, VEMCO is located in the Atlantic Standard Time zone, which is four hours behind UTC. The offset value "– 4" must be entered in the VR100 for the receiver to display the time at VEMCO. Samples of UTC conversions are listed in the table below.

Conversions from UTC to Standard (winter) Local times	
LOCAL TIME ZONES	**CONVERSION**
Pacific Standard Time	UTC – 8 hours
Mountain Standard Time	UTC – 7 hours
Central Standard Time	UTC – 6 hours
Eastern Standard Time	UTC – 5 hours
Atlantic Standard Time	UTC – 4 hours
Greenwich Mean Time	UTC
Central European Time	UTC + 1 hours
Eastern European Time	UTC + 2 hours
Moscow Time	UTC + 3 hours
Indian Standard Time	UTC + 5:30 hours
Australian Western Standard Time (China)	UTC + 8 hours
Japan/Korea Standard Time	UTC + 9 hours
Australian Eastern Standard Time	UTC + 10 hours

How to set the offset is explained in section 2.1.2.

The Set Local Time screen also displays the date the time was last set and by whom, either the user (USER), the GPS (GPS), or the PC software (USB). If the display reads DFLT, then either the time has never been set or the time was lost if the battery was fully drained of power and recharged. The time is maintained as long as the battery is charged.

6.8 GPS

The GPS (Global Positioning System) works by coordinating position information from multiple satellites. It needs to see three satellites to get a good position fix. Once it sees even one satellite, it can download an almanac from that satellite to get an idea of where to expect other satellites to be located, and therefore get its three satellites faster.

On the VR100 receiver screen, when the GPS is locked and getting position fixes then the longitude and latitude will be displayed on the second line of the main menu, in decimal degrees:

XX.XXXXXA XXX.XXXXXB

where X is a digit (0-9), A is N (North) or S (South), and B is E (East) or W (West).

When the VR100 is not locked, the GPS message displayed will be one of those listed in the table below. The status of the GPS is updated every 5 seconds.

GPS Status Messages	
Display	**Meaning**
Getting Fix	GPS is searching for satellites. The GPS must see at least 3 satellites for a minimum of 15 seconds to begin giving position fixes.
High PDOP	GPS sees at least 3 satellites, but cannot get a fix because satellite PDOP is too high. This indicates the satellites in view are not positioned well enough to provide a reliable fix.
Rcvr Fault	GPS Antenna is broken; report to VEMCO for instructions

IMPORTANT

The VR100 internal GPS is designed to provide accurate time sync data for the system clock and GPS coordinates for the purpose of marking approximate position whenever a VEMCO transmitter is detected within acoustic range (up to 2 km distance). The VR100 GPS was not intended to provide precise tracking positions or as a navigation aid designed to assist in planning routes. The VR100 GPS is not to be used for any applications in which the reliability or accuracy could result in a situation of personal injury.

For optimal GPS operation ensure that you are using the latest version of VR100 firmware version (version 3.2.0 or later).

To check firmware version, select: Config → 2 System → 6 Version → MCORE

We recommend that you use a WAAS enabled handheld GPS receiver along with the VR100.

The Global Positioning System (GPS) is operated by the U.S. Government, which is solely responsible for the accuracy and maintenance of the GPS network. The accuracy of position fixes can be affected by the periodic adjustments to GPS satellites made by the U.S. government and are subject to change in accordance with the Department of Defence civil GPS user policy and the Federal Radio navigation Plan. Accuracy can also be affected by poor satellite geometry and obstructions, like buildings and large trees, and boat canopies.

The accuracy of GPS fixes can be improved by a Satellite Based Augmentation System (SBAS), which is only available is certain areas of the world. The VR100-200 hardware version supports these SBAS services, depending on your geographic location:

- WAAS (North America)
- EGNOS (Europe)
- MSAS (Japan)

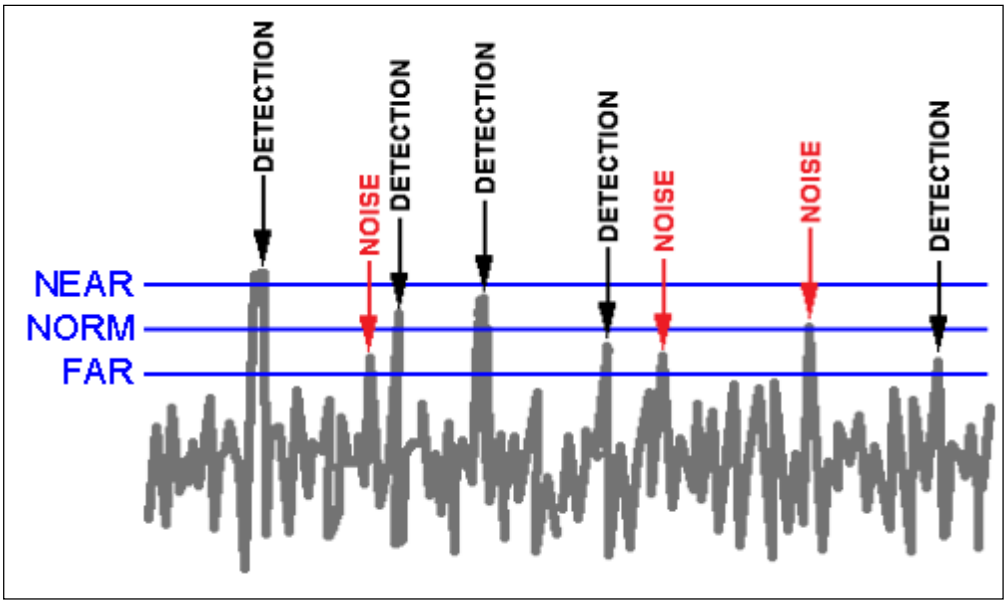
The VR100 will utilize SBAS if the signal is detected, and this will be indicated by displaying "SBAS" on the third line of the main menu screen.

This feature is not supported by the VR100-100 hardware version.

6.9 Detection Parameters

The detection parameter levels are used to determine how a real signal, referred to as a detection, is distinguished from background noise. The VR100 constantly receives a signal similar to the one shown in the drawing below. This usually includes a large amount of background noise from sources such as noises in the hydrophone's environment, electronic components in the receiver, etc. A "cut-off" level must be selected to decide what is a genuine detection and what is a spike in the background noise. A spike in the background noise that is mistakenly identified as a detection is called a "false-detection". The VR100 allows the user to select one of three levels to be used to determine what is considered a genuine detection. These levels are Near, Norm, and Far.

1. **NEAR**: This is the "safest" detection level because it rejects anything that could be noise, nearly eliminating false-detections. Unfortunately, it may reject fainter signals that are real. In the sketch below, everything over the "Near" line is considered a genuine detection. In this case, only one signal (the first one) was accepted. The other four signals were incorrectly considered to be background noise and weren't included. Use the "Near" level when the "Norm" level is receiving too many echoes. This can happen when the tags are in an enclosed area like a tank.



NOTE: This example has been exaggerated for illustration purposes. In most cases there will be no false detections with Near or Norm, and very few with Far.

2. **NORM:** This is the medium level. It rejects some noise but also allows some noise to be mistaken as detections (false-detections). This level will correctly accept more detections than the "Near" setting but will still mistake some genuine signal as background noise. In the sketch below, everything over the "Norm" line is considered a genuine detection. In this case, four signals were accepted – the first three were genuine detections and the last was noise. Use the "Norm" level for general use.

3. **FAR:** This level has more false detections. All genuine detections will be accepted, but a larger number of false-detections will also be accepted. In the sketch below, everything over the "Far" line is considered a genuine detection. In the sample below, eight detections were reported but only five of them were genuine detections. The other three detections were actually noise (false-detections). Use the "Far" level when the tags are far from the hydrophone and the signals received from the tags are weak.

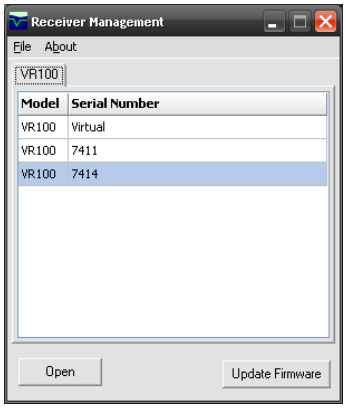
6.10 MAP Updating

VEMCO's current code map is MAP-113. If your VR100 does not contain this map, updating the map in the VR100 is as simple as transferring settings from the VR100HS software to the VR100 receiver. Follow these basic steps to make the transfer.

STEP 1

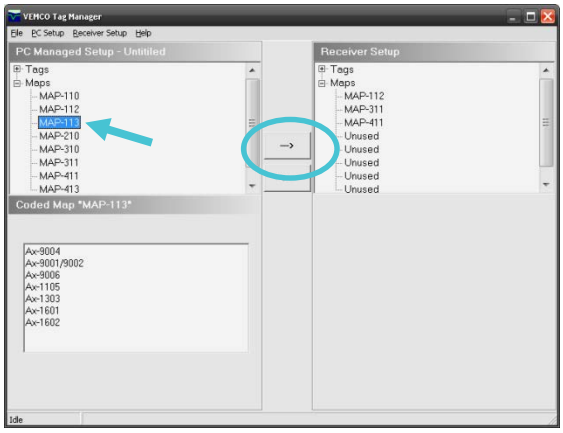
Download and install the latest VR100HS software from www.vemco.com.

Connect the VR100 to the computer running VR100HS. Details are located in the VR100 user manual. Select the receiver from the list and click "Open", or simply double-click the desired receiver in the list.



STEP 2

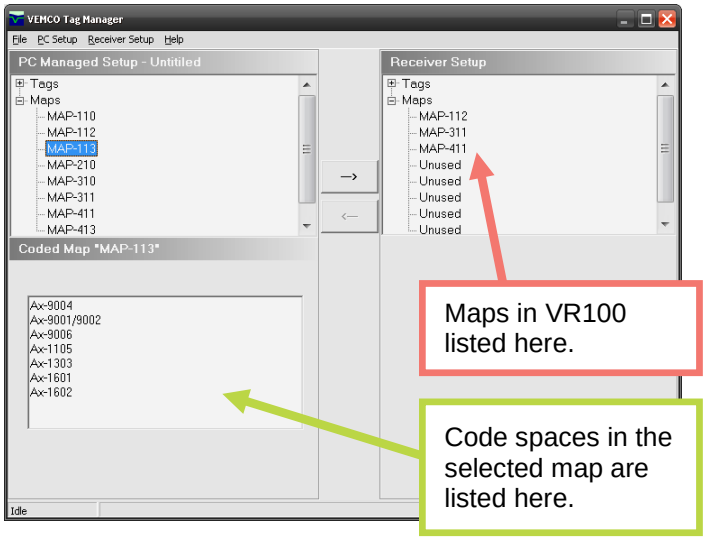
Select *Tag Manager* in the *Settings* menu to open the VR100 Receiver window.



STEP 3

Select "MAP-113" in the PC Managed Setup on the left and click the arrow pointing to the right. Verify "MAP-113" appears in the Receiver Setup list on the right.

NOTE: MAP-113 is the default map used for 69kHz coded tags. MAP-413 is the default map used for 180kHz coded tags.



6.11 Firmware Updating

Firmware refers to the internal software that operates a VR100 receiver. It is not to be confused with VR100HS, the PC software used to communicate with the receiver. Firmware updates are rare and will occur to either deal with a hardware change or occasionally for a significant addition to functionality.

Pre-Update Checklist:

- ☐ Install the latest version of VR100HS, which is available at www.vemco.com/downloads, on all PCs, laptops and field laptops prior to updating the VR100 receiver firmware.
- ☐ Download the latest VR100 firmware available at www.vemco.com/downloads/.
- ☐ Verify that your VR100 was purchased after March 2006. If it was purchased before March 2006 and has not been upgraded at the factory, then you will not be able to update the firmware yourself.
- ☐ Offload all data from your VR100 before installing the new firmware.
- ☐ Ensure that your VR100 receiver is powered using the supplied AC Adaptor during the firmware update process.

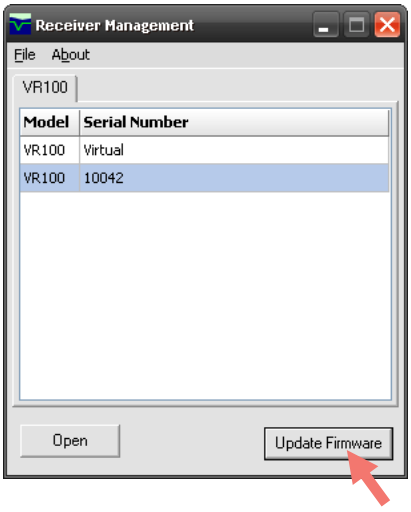
Updating VR100 Firmware:

STEP 1

Connect your VR100 to an available USB port on your PC using the supplied USB communications cable.

Run the VR100HS software and turn the VR100 receiver on. The receiver name will appear in the Receiver Management window once it has been detected by the software.

Select the receiver's serial number from the list in the Receiver Management window and click the "Update Firmware" button in the bottom right corner of the window.



NOTE: It is important to leave the USB communications cable connected to your receiver during the firmware installation.

Do not disturb your PC or VR100 receiver during the firmware installation.

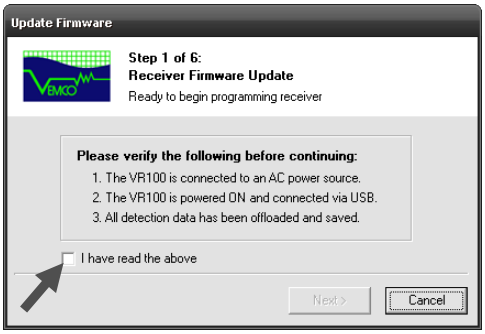
Do not power the receiver off during firmware installation.

Only connect to one (1) receiver at a time for firmware updates.

Continued…

STEP 2

Verify that the VR100 is ready for a firmware update. The wizard will not allow you to proceed until you check the box confirming that you have read the instructions.

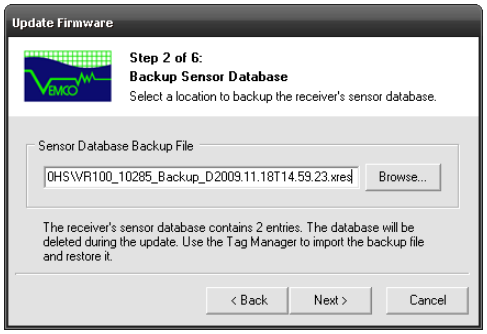

Update Firmware
Step 1 of 6:
Receiver Firmware Update
Ready to begin programming receiver
Please verify the following before continuing:
1. The VR100 is connected to an AC power source.
2. The VR100 is powered ON and connected via USB.
3. All detection data has been offloaded and saved.
I have read the above
Next >
Cancel

STEP 3

Backup the Sensor Database. If you would like to change the file's location, click the "Browse" button and select a new location and/or filename. The sensor tag database in the VR100 receiver may be erased during the firmware update (when upgrading from version 2.2.0 or earlier).

If no sensor information has been entered into the VR100, the sensor database is reported as empty.

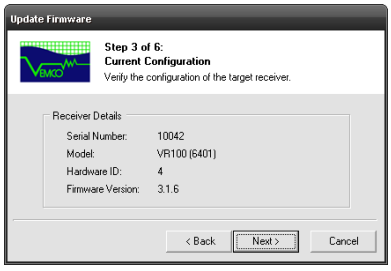
Click "Next" to continue.


Update Firmware
Step 2 of 6:
Backup Sensor Database
Select a location to backup the receiver's sensor database.
Sensor Database Backup File
0HS\VR100_10285_Backup_D2009.11.18T14.59.23.xres
Browse...
The receiver's sensor database contains 2 entries. The database will be deleted during the update. Use the Tag Manager to import the backup file and restore it.
< Back
Next >
Cancel

STEP 4

Confirm the current configuration of the firmware and hardware versions of the VR100 receiver are displayed.

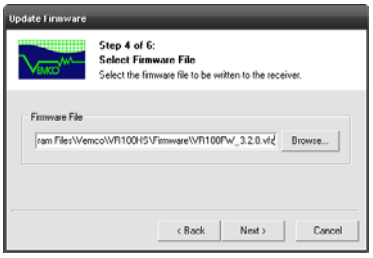
Click "Next" to continue.



STEP 5

Click the Browse button to choose the new Firmware Image file (.vfa). Only files with the correct extension will be shown.

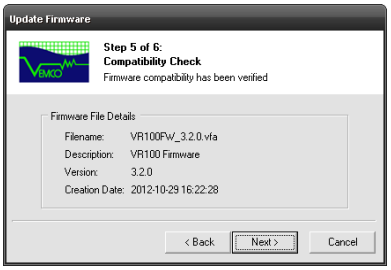
Click "Next" to continue.



STEP 6

Wait for the Compatibility Check to pass. The VR100 software tests the new firmware file before it is sent to the VR100 receiver.

Click "Next" to continue.



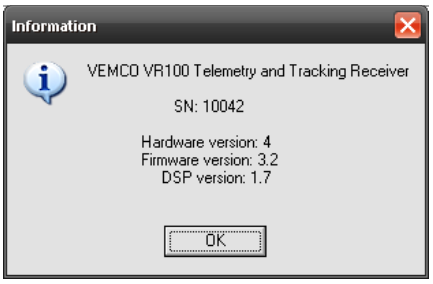
STEP 7

Do not turn off receiver, disconnect USB cable or close VR100 Software during the update process. You will be notified when the firmware update has been completed successfully.

STEP 8

Check the firmware version by opening the receiver in the Receiver Management window, and selecting *Help/About VR100…* from the menu.

If you are using non-standard coded tag maps or continuous tags, please verify channel configuration settings on the receiver after firmware update.



7 Common Questions

7.1 General Questions

7.1.1 What is a code map?

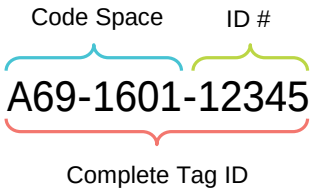
There are three default code maps used with VEMCO coded tags, MAP-113 for 69 kHz, MAP-413 for 180 kHz and MAP-311 for 81 kHz. These maps are installed in the VR100 by default. Several legacy maps can be installed on the receiver using the VR100HS PC Software, but should only be used if directed by VEMCO Customer Support. The current default map definitions are listed below.

Map Name	Code Spaces	Notes
MAP-113	A69-1105, A69-1303, A69-1601, A69-1602, A69-9001/9002, A69-9004, A69-9006	Default Map for 69 kHz Coded Tags
MAP-311	A81-1008, A81-1105, A81-1206, A81-1303	Default Map for 81 kHz Coded Tags
MAP-413	A180-1701, A180-1702	Default Map for 180 kHz Coded Tags

IMPORTANT: VEMCO tag datasheets will contain a Code Space name which fully defines the tag parameters necessary for the receiver. Ensure that you select a Code Map that contains all the code spaces required for your tags.

7.1.2 Where do I find the Code Space?

A complete VEMCO Tag ID consists of two distinct parts. It is the combination of Code Space and ID that provides all the relevant information needed to identify your transmitter.



Code Space: A code space provides VEMCO receivers details about how a particular tag will transmit its information so it can decode appropriately.

Code Map: Receivers are programmed with a code map that outlines all the code spaces they are able to decode.

It is important that VEMCO customers sort and analyze their data using the complete Tag ID for a number of reasons:

1. It allows you to correctly distinguish between animals in your data set and/or those of other researchers, which may have the same ID # but different code spaces.
2. If you are using VEMCO equipment with real-time capabilities (e.g. VR2C cabled receiver), it is important to search on or parse out the complete Tag ID in any scripting programs being used to ensure correct tag identification.
3. Complete Tag IDs are required by our support team for any unknown ID identification requests.

7.2 VR100 Related Questions

7.2.1 Why do I need to enter the sensor tag information into the receiver?

Information must be entered for sensor transmitters for the data to be displayed in the correct units. Data received from coded sensor transmitters can be displayed without this information stored in the receiver, but it will be raw data and need to be converted manually.

7.2.2 Do I need to enter tags in the receiver if they don't have a sensor?

Tags that do not contain a sensor do not need to be entered in the VR100. Entering information is only required if data is being sent to the VR100 from the tag.

7.2.3 Is the VR100 submersible?

NO! The hydrophone (see section 1.5.1) is submersible but the receiver is not. The receiver's case is designed to withstand light water contact as long as the hydrophone is connected to the case and the remaining three protective caps are in place (see section 1.4.1). Don't let water accumulate on the receiver's front panel.

7.2.4 Can I enter sensor tag information without connecting to a computer?

Yes! The sensor tag's information can be entered on the VR100 keypad. Follow the steps listed in section 2.2 and use the tag's information found on the Transmitter Specification sheet shipped with the tag.

7.2.5 Can I take a GPS reading manually?

Yes! A GPS reading is automatically stored in the VR100's memory with each detection if the GPS receiver is "locked", but a manual GPS reading can be also be taken and stored in memory by pressing the LOG GPS button on the front panel of the receiver (see section 1.4.2). When the LOG GPS button is pressed while the GPS is locked, a message will briefly appear on the screen to let you know the location was stored.

If a GPS lock is not currently established, a warning will appear on the VR100 screen indicating there is no GPS fix – the location cannot be stored because it cannot be identified. Wait until a lock is established and press the LOG GPS button again.

> If the GPS receiver is not "locked" when the LOG GPS button is pressed, a warning screen will appear to let you know the VR100 does not currently have a GPS fix. The location will not be stored.

7.2.6 How do I view a channel's setup without changing the setup?

The channel configuration can be either viewed or edited. How to edit the configuration is explained in section 2.3. How to view the configuration is described in the steps below.

From the Main screen:

1. Select Config (see section 6.1.2.1).
2. Press "1" on the keypad.
3. Select the desired channel number on the keypad and press the right selection button for "Configure". The channel's configuration is displayed in a summary screen.
4. Select "Accept" (right selection button), or press the MENU button, to return to the Channel window without making changes to the channel's configuration.

7.2.7 How do I view the Code Maps setup in the VR100?

Code Maps and Code Spaces are discussed in section 7.1. To view them in the VR100, from the Main screen:

1. Select Config (right selection button).
2. Press "3" on the keypad.
3. Select the desired code map number on the keypad.
4. Select "View" by pressing the right selection button.
5. Use the arrow buttons to cycle through the Code Spaces supported by the Code Map.

7.2.8 What is an event and how do I know if I have any?

An event is either a detected ping from a tag, a GPS position fix, or a system action (like a start-up, a change to the receiver's configuration, etc.). The number of events increases until the memory is full at approximately 85000 events. The number of events stored in a VR100 can be viewed in the Event Log screen (see section 4.3.2).

7.3 VR100HS Software Related Questions

7.3.1 How do I load the VR100's tag setup to the PC?

Simply save the tag setup as explained in section 3.8.4. This creates a resource file (see section 6.6.3) that can be used with multiple VR100 receivers and on multiple PCs.

7.4 Transponding Related Questions

7.4.1 I can't communicate with the receiver. What should I do?

First, check your location. You may be farther from the receiver's deployed location than you realized; moving closer would help communications. If that doesn't help, try increasing the VR100-200's transmit power level.

If you're very close to the deployed location and the water is shallow, try reducing the VR100-200 transmit power level slightly. It's possible the signal is acoustically over-saturating the area, or causing echoes, and therefore interfering with communication.

If you can tell the remote receiver is hearing the command and transmitting a response but the VR100 isn't decoding it you can try increasing the VR100 gain.

7.4.2 When I try to release the VR2AR, the VR100-200 says "Unarmed."

The VR100-200 is letting you know that the VR2AR has not been "armed" or prepared to release. This "arming" is a protective measure against accidently releasing a VR2AR. Select Acoustic Release (#3) and then Arm (#2) to arm the receiver and prepare it for release (see section 4.4.5).

7.4.3 The VR100-200 says "Failed to Release" – now what?

If the VR100-200 reports "Failed to Release" when you attempted to release a VR2AR from its mooring, then repeat the release sequence (section 4.4.5). If you still don't have success, contact VEMCO.

7.4.4 Why does the VR100 say "No response from VR2Tx/AR"?

This indicates that the signals from the VR2Tx/VR2AR are not reaching the transponding hydrophone of the VR100-200. It is possible for the receiver to hear the VR100 but the VR100 may not hear the receiver. To solve this problem, first check your position compared to the receiver and get as close as you can. Also check the receiver's transmit power level (see section 6.2.1) and increase it if possible. If the power level is already high, and you're working in shallow water, trying lowering the power to decrease any echo effects. You could also try increasing the VR100 gain (see section 4.2.3), especially if you can hear faint pings being transmitted but they are not being decoded.

7.4.5 Why did a message appear telling me to enable channel 8?

Channel 8 is used for acoustic communication with a receiver. If channel 8 is not configured for transponding, then when "Transpond" is selected (see section 4.4.1) a message will appear on the VR100 display warning that channel 8 needs to be configured and enabled. When this screen is visible, selecting "Next" will allow you to select "Transponding" as the type of configuration desired. Select "Next" again and then "Accept" to finish the configuration. Enable the channel as described in section 2.3.5.

8 Troubleshooting

TROUBLE	POSSIBLE SOLUTION
Can't hear audio signal but detection indicator light is flashing.	1. Volume is too low. 2. Audio is muted (see section 6.4). 3. Headphones are plugged into VR100.
Display blinks and receiver makes a repeated clicking sound.	Battery is low and needs to be charged (see section 5.2).
Receiver won't turn on after I turned it off.	The battery may need to be charged (see section 5.2).
Computer does not see the receiver when the USB cable is plugged in.	1. Turn VR100 off and then back on. 2. If using an external USB hub, as suggested (see front of manual), then check that the hub is powered.
I connected my VR100 to the computer with the VR100HS software but my VR100 isn't listed in the *Receiver Control and Management Interface* window.	Try cycling power on VR100 receiver. If the VR100 receiver is connected via a USB hub, disconnect and the reconnect the USB hub from the computer. If you received your VR100 after March 2006, either new or upgraded, then you must use VR100HS software version 2.0 or higher for the software to communicate with the VR100.
I connected my VR100 to the computer with the VR100HS software but I get a message saying the software is not compatible.	You are running firmware on the VR100 receiver that is not compatible with the PC Software. Ensure that you are using the latest version of the PC Sofware. http://www.vemco.com/support/vr100_support.php If you received your VR100 before March 2006 and it hasn't been upgraded, then the VR100HS software version 2.0 or higher won't be able to communicate with the receiver. An older version of software must be used until the VR100 is sent to VEMCO for upgrade.

9 Appendix

9.1 Cleaning Instructions

Clean the VR100 with a damp cloth and mild detergent.

Do not use solvents. Do not use abrasive cleaners. Do not allow oils, resins, paints, or similar gummy materials to enter the case vent – these can clog the vent and prevent it from operating properly, possibly creating a safety hazard.

9.2 Contact Information

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Phone: +1-902-450-1700
Fax: +1-902-450-1704

Web Site: www.vemco.com

9.3 VR100 Specifications

Product name	VR100 Ultrasonic Telemetry & Tracking Receiver
Frequency Range	12 to 200 kHz
Operating Temperature	Operational between -15°C and +40°C, although battery life will be reduced below 0°C. Recommended operation is between 15°C and 25°C. Water in which a hydrophone is submerged should not freeze.
Ingress Protection Rating	IPX5
PC communication	Computer controlled via USB connection
Gain control	Automatic or manual
Hydrophone type	Omni-directional: VH165 (50-85 kHz), VH180 (180 kHz), VHTx-69kHz Transponding (50 - 85 kHz) Directional: VH110 (50-85 kHz), VH110-D (180 kHz)
Hydrophone cable length	VH165, VH180, VH110, VH180-D: 10 m (standard) VHTx-69kHz, VHTx-180kHz: 25 m
Battery Life	Approximately 12 hours when operating between 10°C and 40 °C with backlight off, less with backlight on.
AC Power Supply (battery charger)	100-240V; 50/60Hz; 0.80A max Indoor use, altitude up to 2,000 m., maximum relative humidity is 80%, mains supply voltage fluctuations up to 10% of the nominal voltage, overvoltage category II, pollution degree 2.
DC Power Supply	10 - 15VDC; 3A max
Display	4 x 20 character LCD display
Software	VR100 Host Software (VR100HS); Windows Vista/7/8
Signal strength meter	LCD screen displays relative signal strength numerically and graphically
Water resistance	Splash resistance
Physical Dimensions (approximately)	34 cm x 32 cm (with handle extended) x 15 cm
Physical Weight	VR100-200: 6.5 kg VR100-100: 5.2 kg
GPS Accuracy	VR100-200: Horizontal: < 5 meters (16 feet), 90% typical* (GPS only) < 4 meters (13 feet), 90% typical* (with WAAS, EGNOS or MSAS) VR100-100: Horizontal: < 9 meters (30 feet), 90% typical* GPS only (does not support augmentation such as WAAS, EGNOS or MSAS) VR100 firmware 3.0.3 or later required ** Subject to accuracy degradation under the United States Department of Defense-imposed Selective Availability Program.* *WAAS = Wide Area Augmentation System; EGNOS=European Geostationary Navigation Overlay Service; MSAS=Multi-functional Satellite Augmentation System*

9.4 Warranty and Disclaimer

AMIRIX Systems Inc.
Warranty and Disclaimer

WARRANTY
AMIRIX Systems Inc., doing business under its trade name VEMCO, provides a one (1) year warranty period for the Product from date of shipment.

VEMCO warrants that on the date of shipment all Products manufactured by VEMCO are free from defects in material and workmanship under normal use and service. This warranty applies to the components necessary for equipment upgrades, i.e. the VR1/VR2 to VR2W upgrade. With respect to transmitter products, while VEMCO is able to predict battery life with some certainty, VEMCO cannot guarantee that these Products will remain functional while submerged for extended periods of time. This warranty does not apply to any equipment, materials or design supplied by Buyer or a third party; re-battery services provided by VEMCO; Products for which VEMCO has not received payment; problems that results from: external causes such as accident, abuse, misuse; servicing not authorized by VEMCO; usage not in accordance with Product instructions; failure to follow the Product instructions or failure to perform preventative maintenance; usage of accessories, parts or components not supplied by VEMCO.

This warranty shall survive delivery only on the conditions and subject to the limitations set forth below.

NOTICE PERIODS
To receive a warranty remedy for a Product, Buyer must contact VEMCO's Customer Support Department during the warranty period to receive the Return Material Authorization ("RMA") instructions. Each defective Product returned for warranty remedy must be shipped at the Buyer's expense according to the RMA instructions and must include reasonable proof that the claimed defect is due to a matter embraced within the warranty set forth above and that such defect did not result from any act or omission of Buyer, including but not limited to any failure to operate and maintain the Product in accordance with VEMCO's applicable written instructions.

REMEDY
VEMCO's liability, and the Buyer's exclusive remedy under this warranty, as to a defect in material or workmanship, is limited to the repair of such defect in the accessory, equipment or part in which the defect appears or, at VEMCO's option, to the replacement of such accessory, equipment or part with a similar item free from defect. As to any item repaired by VEMCO or furnished as a replacement by VEMCO, VEMCO's liability and the Buyer's exclusive remedy to the repair or replacement of such item for any further defect in material or workmanship, provided VEMCO receives written notice at Halifax, Nova Scotia, of such further defect from BUYER within ninety (90) days after the repaired or replaced item is shipped to BUYER and provided that BUYER returns same to VEMCO as provided under "Notice Periods".

RETURNED ITEMS
All repairs, replacements and corrections described above shall be performed by VEMCO at its plant at Halifax, Nova Scotia, or at such other place as may be mutually agreeable, and with reasonable care and dispatch in order that the Product, accessory, equipment or part will not be kept out of service longer than necessary. Return to BUYER of a repaired, replacement, or corrected accessory, equipment, part or Product shall be at VEMCO's expense. Title to and risk of loss of the Product, accessory, equipment, or part returned to VEMCO pursuant hereto shall at all times remain with the BUYER, except that title to a returned accessory, equipment, part, or Product shall pass to VEMCO concurrently with shipment to BUYER of any item furnished by VEMCO to BUYER as a replacement therefore. VEMCO shall have only such responsibility for any Product, accessory, equipment, or part owned by the BUYER and in the possession of VEMCO as is chargeable by law to a bailee for hire, but shall not be chargeable for loss of use thereof.

WEAR AND TEAR
Normal wear and tear and the need for regular maintenance shall not constitute a defect under this warranty.

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EXPORT
Products and associated materials supplied or licensed hereunder may be subject to various export laws and regulations. It is the responsibility or BUYER to comply with such laws and regulations.

NEGOTIATED AGREEMENT
It is fully understood by the parties that the price of the Product and other mutual agreements of the parties set forth in this agreement were arrived at in consideration of this warranty, SPECIFICALLY INCLUDING THE WAIVER, RELEASE AND RENUNCIATION BY BUYER SET FORTH ABOVE (DISCLAIMER AND RELEASE).

9.5 Glossary

Automatic Gain Control (AGC): Automatic Gain Control changes the gain level as the VR100 deems necessary without input from the user. The VR100 uses signal strength to determine if the gain level should increase, decrease, or remain constant. In most conditions, the VR100 should be used in the manual gain mode. Section 4.2 explains how to switch between manual and automatic gain control.

Blanking Interval: The Blanking Interval is the length of time (in milliseconds) after an acoustic signal has been received on a given channel in which the VR100 will ignore any subsequent signals on that same channel. This is to eliminate the reception of echoes by the receiver.

Background noise: Background noise is the total noise from all sources other than the sound of interest.

Channel: A channel in the VR100 is a group of configuration settings used to listen to VEMCO tags. For example, a channel can be configured to listen for continuous pingers that operate at 60 kHz. Another channel can be configured to listen for coded tags operating at 69 kHz. Up to eight channels can be monitored simultaneously.

Code Map: A Code Map describes a collection of Code Spaces. When a receiver is configured with a particular Code Map, it can detect and decode all the types of transmitters in that map. See Table 4.3-3 for a list of supported maps. MAP-113 is the current default map for 69kHz transmitters and allows the VR100 to properly detect and decode all currently supported VEMCO Tags.

Code Space: Code Space describes all the parameters that a receiver needs to properly decode each tag. These parameters include the numbers of pulses, the coding technique, the length of the first interval etc. Tag specification sheets will always include a Code Space value. Users must ensure that they select a code map that contains the code space(s) of the tags they are detecting.

A69-1303 is an example of a valid Code Space label. The “A69” indicates an Acoustic Tag operating at a frequency of 69 kHz. The “1601” is a unique number that is understood by the receiver firmware to determine how to detect and decode the tags. The VR100 Receiver will report tag detections as Code space and ID#. It is important to note that a tag that transmits a code space-ID, e.g., A69-1303-2056, is a different transmitter then one with a label of A69-1206-2056. The ID codes are the same but the Code Space is different and uniquely identified by the VR100!

Coded tags: Coded tags transmit a series of acoustic pings to form an ID (identity) number recognized by the receiver. The pings form a “ping train” that is usually followed by either a fixed or random delay. The type and length of the delay is set at the time the tag is ordered and cannot be changed once the tag is built.

Continuous tags: Continuous tags transmit the acoustic pings continuously, without delays between transmissions. Continuous tags are available with or without sensors.

Coordinated Universal Time (UTC): UTC is the international time standard. It is the current term for what was commonly referred to as Greenwich Mean Time (GMT). Zero (0) hours UTC is midnight in Greenwich, England, which lies on the zero longitudinal meridian. Samples of the conversion factor needed to convert from UTC to the local time zone are found in Table 4.3-1.

Decibel (dB): A decibel is a logarithmic unit used for measuring the strength of a signal. A decibel is one tenth of a "bel".

Detection Parameters: The detection parameter determines what is identified as a received ping and what is considered background noise (see section 6.4).

Pinger: A VEMCO tag that contains no sensors. It can have either a coded or continuous transmission schedule.

Position dilution of precision (PDOP): PDOP is a unitless measure that indicates when satellite geometry will provide the most accurate results. A low PDOP indicates the satellites are nicely arranged to give a good position. The PDOP may be improved by facing the VR100 GPS antenna towards the equator where more satellites are located.

Tag: A VEMCO tag is an acoustic transmitter that is attached to a marine creature and transmits an acoustic signal. The acoustic signal is received by a VEMCO receiver. VEMCO tags can transmit either a coded or continuous signal, with or without sensor data. After a tag is powered, it will continue to broadcast according to factory setup until powered down.

Sensor transmitter: A VEMCO tag that has at least one sensor. The type of sensor is usually included in the transmitter's name. For example, a V16P has a pressure (depth) sensor and the V16T has a temperature sensor. A sensor transmitter can also have either a coded or continuous transmission schedule.

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